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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

BRANCH OF RESEARCH

MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS

FOREST PRODUCTS

FOREST ECONOMICS

RANGE RESEARCH

OCT 1931



BRANCH OF RESEARCH

October, 1931

CONTENTS

	<u>Page</u>
Highlights in Station Reports	1
Forest Experiment Stations	
Allegheny	2
Appalachian	5
California	8
Central States	17
Intermountain	22
Northern Rocky Mountain	27
Pacific Northwest	37
Southern	46
Southwestern	53
Research Activities in R-2	58
Manuscripts	61
Forest Taxation Inquiry.	63

HIGHLIGHTS - OCTOBER 1951 REPORTS

<u>STATION</u>	<u>PARAGRAPH</u>	<u>MATERIAL</u>
ALLEGHENY	Mycorrhiza	Dr. Rayner's visit
APPALACHIAN	Fire Studies	Technique
CALIFORNIA	Redwood	Fire damage
	Influences - Ecology	Charting vegetation
	Fire visibility	Smoke candles
	Products	Comparison of Methods
CENTRAL STATES	Black Walnut Litter	Data
	Locust Borer	Correlation
NORTHERN ROCKY MOUNTAIN	Weather and Inflammability Relation of Fire Perimeter	Behavior of Wood Samples to area
PACIFIC NORTHWEST	Selective Logging	Skidding Costs
SOUTHWESTERN	Santa Fe Plots	Douglas Fir Reproduction
REGION 2	Entire Report	

(Over)

ALLEGHENY FOREST EXPERIMENT STATION

General

The Administration's economy program made inevitable the long-apprehended reduction in the technical staff of the Forest Service to five men; Morey, the junior member of the staff, was therefore transferred to the Northeastern Station at the end of the month. A tireless worker, alert, and interested in the whole of forest research, Morey can be ill-spared. Another loss which has occasioned us real regret is that of Mrs. Schnur of the clerical staff. She accompanied her husband on his detail to Washington. Hatch was on furlough at Harvard most of the month, returning to the Station only for Dr. Rayner's visit.

Mr. Jackson of the Bureau of Plant Industry has converted into an office the small laboratory on the third floor of our office building. The equipment has been transferred to our two laboratories in McFarlane Hall. These laboratories have a combined floor space of over 300 square feet, and we may well be proud of them. The installation of a ventilating fan, and the laying of an asphalt tile floor, in the basement laboratory have apparently overcome drawbacks to its efficient use, and the latest convenience to be installed is circulating hot water. Few, if any, laboratories in McFarlane Hall are better equipped than ours.

The University has now given its approval to the plan we had proposed for bringing about the erection of a new botany building. That is, representatives of the University are actively canvassing the membership lists of local horticultural, botanical and forestry associations, and garden clubs, with the object of locating possible donors to a building fund.

We hope that we have seen the last of the Extensive Revision job. The written report accompanying our statistical tables amounted to 70 pages, and we had earlier submitted memoranda of about half that length on the subject of growth. Schnur represented the Station at the Washington conference on growth rates.

The preparation of a report, in accordance with Manual instructions, on the Kane Experimental Forest, preparatory to its proclamation by the Forester, was made possible by Morey's completion of the survey notes, and the compilation of other data on the tract by Hough. Before leaving the Allegheny National Forest Morey plotted the newly established boundary of the experimental area on the Status, Atlas, and correction maps of the Forest. Arrangements were completed with Mr. C. G. Johnson, a forest guard stationed about three miles from the headquarters on the Kane tract, to visit the buildings three times a week during the coming winter, and to remain there overnight on certain days during the hunting season when depredation is likely to take place.

Forestation

Assisted by William L. Shetter, field assistant, Wood began the re-examination of the plantations at Camp Ockanickon. It is already apparent that rodent damage has been particularly severe since the last count in September, 1930. October weather was unusually favorable to field work. High temperatures early in the month raised the mean temperature about three degrees above normal. Twenty-two days were recorded as "clear", and three as "partly cloudy". Only three widely separated rains occurred during the month, but these totaled 3.09 inches, only about 0.35 inches below normal. Thunder showers occurred three times during the month, the last one as late as October 29. We are beginning to think that there is no such thing as normal weather.

Management

In the few days left him after completing arrangements for the winter care of our buildings at Kane, and the compilation of the necessary information for a report on the Kane area, Hough began some new analyses of the data on the virgin timber in East Tionesta Creek. His re-examination of the sample plots on Little Arnot Creek marked the end of the fourth growing season since these plots were established.

Morey did an excellent job of getting on paper, practically in shape for publication, the data he obtained last summer on the age of the stand at Hearts Content. His discussion of age relationships in this virgin stand is well worthwhile, and points the way to a much more satisfactory job to be done in the virgin tract on East Tionesta. Other articles which Morey completed before leaving were a comparison of the vegetation at Hearts Content and at Cook Forest, a note on seedling analysis, and a compilation of growth data, in the form of growth percents, prepared originally in connection with the revision of the Capper Report.

Collection of a small quantity of acorns, to produce seedlings for later experimental use at Camp Ockanickon, required more time than was anticipated by Wood, because of the scanty crop on chestnut oak. Literally thousands of trees were examined for seed. Smaller trees were shaken from the ground and the larger ones climbed and shaken. In spite of this, the total amount of chestnut oak seed collected was not as great as that obtained from a single good seed tree in 1930. One tree which bore 980 acorns in 1930 bore only 34 in 1931; another which bore 970 in 1930 did not have a single acorn on it last year. A few post oaks bore a fair crop of fruit, but the white oaks furnished practically none. The crop of black oak and bear oak (scrub black oak) acorns was abundant.

A high percentage of the chestnut oak acorns collected this year showed insect (weevil?) damage. Heretofore this species has been relatively free of damage in the vicinity of Camp Ockanickon. A peculiar longitudinal splitting of acorns, while still on the tree, may possibly have been induced by insect injury. Wood noted that in some cases the embryo had grown out more or less through the cracks; he planted some of these oddities, after photographing them. He also planted some acorns

from which the extreme radicle end had been nipped by gray squirrels, perhaps in an instinctive effort to prevent germination. The black oaks were badly weeviled this year; insect damage is, however, fairly common with the group every year. Possibly the very dry weather in mid-summer was favorable to insect propagation.

The three seed beds, prepared during the summer, one as a control and two with ground limestone in different quantities, were planted each with 153 acorns. Several other beds were also planted, with a total of 1150 acorns. To supplement the native chestnut and a few post oak acorns a small quantity of white and Spanish oak acorns were obtained from Dr. L. E. Yocum, from the vicinity of Washington, D. C. Some scrub oak acorns were also received from near State College, Pennsylvania; the local crop had been completely destroyed before Wood realized the necessity of forestalling hungry rodents.

Mensuration

In his study of the old loblolly pine plot data from the eastern shore of Maryland Schnur found it necessary to obtain some additional original material from the State Forester's office in Baltimore. After conferring with Schumacher, Schnur has decided to make a special study of diameter distribution in these plots, with special reference to changes which have taken place as the stands grew older. Because neither our own volume tables, or those prepared by Cope in Maryland, seemed to conform very closely to the actual volumes obtained in Maryland, Schnur may be forced to prepare a new volume table probably by the recently developed formula, or exponent, method.

Special Studies - Mycorrhiza

The entire staff has found the visit of Dr. Rayner most stimulating. Dr. Rayner gave one semi-popular lecture at the University of Pennsylvania chiefly on the mycorrhiza of the Heather, and a somewhat more technical lecture before a joint group of Station and Botany Department representatives. She spent a couple of days under the guidance of our mycorrhiza workers in south Jersey, where she found conditions very similar to those on the Bagshot sand in England. Because we have been used in American research to more or less crude and empirical methods of investigation, and have sometimes ruefully contrasted our methods with those of Europeans, it has been rather pleasing to learn that Dr. Rayner does not scorn the so-called empirical methods. Her studies of forest mycorrhiza in England have included extremely practical applications to the whole program of afforestation in which England is now engaged on a comparatively large scale. She has achieved a most startling stimulation of height growth in Scotch pine plantations on the Bagshot sand by so simple a method as the application of litter obtained from thrifty

stands of natural pine. Although she confesses frankly that bacterial activity may account for part of this stimulation, she points to the fine development of mycorrhiza on the roots of the treated seedlings, and their absence from the roots of the untreated. She would like to see experiments of this character undertaken in America in poorly developed plantations, and as a result of her enthusiasm for this method of research we are going to make a definite effort to interest outside agencies, such as the New Jersey State Forest Service. This is directly in line with the intention we have always had of endeavoring to supplement our own activities in any field of research by interesting other agencies. We found Dr. Rayner a first-class advocate of mycorrhiza research, wherever she went.

Forest Pathology

Laboratory experiments are under way again on the relationship between the H-ion and the aluminum ion and damping-off diseases caused by *Pythium*. Previous work dealt with only *Pinus ponderosa* and *Pseudotsuga taxifolia* but this year the experiments will include *Pinus strobus* and *Pinus resinosa*.

The list of new diseases observed has been augmented by the following: A twig blight on *Quercus illicifolia*, *Q. Prinoides* and *Q. Marylandica* in the plains of New Jersey. A basal canker on white pine, Norway spruce and Scotch pine seedlings and transplants in the New Jersey nursery at Washington Crossing. The seedlings were dying in spots and the basal parts bore well developed resinous cankers. The amount of this disease present was sufficient to warrant immediate attention.

The preliminary data gathered on the sprout hardwood decay study this season is being worked up and certain parts will be presented in a later report.

Recently Dr. Doak gave an illustrated talk at the Botany Seminar on the subject of "Photomicrography as an aid in the study of normal and abnormal tissues." We are profiting immensely this school year by the large number of excellent seminars and lectures given at the University. Dr. York is again holding a seminar for forest pathology.

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APPALACHIAN FOREST EXPERIMENT STATION

General

Dr. G. G. Hedgecock, Division of Forest Pathology, had conferences with Hursh and Nelson while enroute to examine the fume-damaged Copper

Basin of Tennessee.

T. R. Truax, of the Forest Products Laboratory stopped for a brief visit on his way to a meeting of the Wood Industries Division, A. S. M. E., held at Winston-Salem.

C. I. Hendrickson, Division of Land Economics, conferred with members of the Station staff and local foresters in reference to a proposed study of tax-delinquent lands in North Carolina.

Influences

Hursh returned October 18 from the Southwest where he observed Forest Service installations for the study of streamflow and erosion. He spent the latter part of October on the Bent Creek Forest in the interest of the Station's streamflow and erosion project. No extensive installations are planned for the immediate future, but a number of problems bearing on the direct effect of forest or other vegetative cover upon the water economy of the area it occupies will be studied. Interception of precipitation, evaporation and transpiration factors, and water and soil relations as affected by the vegetative cover, will be taken up as the project develops.

Fire Studies

Nelson and Sims spent two weeks in Virginia re-examining study areas and inspecting old burns on the Natural Bridge and Shenandoah National Forests. Several days were occupied by travel and discussion with Supervisors Sears and McNair.

A new method of keeping track of reproduction on quadrats was tried out at McFalls Creek, Virginia. Instead of tagging and numbering each seedling or sprout clump their coordinates were recorded. These coordinates serve as numbers and at the same time locate the plant on the quadrat. The method promises to be useful in studying the effects of fire/reproduction since it obviates the difficulty of having tags burned or lost.

Forest Management in North Georgia

Barrett and Loughhead have completed a twenty per cent estimate of the 175 acres of woodland at the Georgia Mountain Experiment Station. The original topographic and timber type map prepared by Stone and Abell a year ago for other purposes was revised at the time for use in more intensive management studies. Woodland boundaries were made into fire lines by clearing all bursh, tree tops, and down logs from a strip six to ten feet wide. About two miles of such line was cleared at a cost of \$5.50 a mile.

In response to a request from the Washington Office for seed of basswood, white ash, yellow poplar, and black cherry, one day was spent collecting at Sosebee Cove. Four pounds of black cherry, two pounds of basswood, and one-half pound of yellow poplar seed were obtained. Although there were fair seed crops of these species no white ash could be located.

Management of loblolly pine

The study of factors affecting increase in growth of loblolly pine following liberation was again taken up by MacKinney, in Washington. The study aims to correlate the several factors affecting increase in rate of growth with the actual increase as shown by 1,500 trees. The results of the study will indicate, at least in part, which trees it will be most desirable to leave in a partial cutting. In the same study the seed producing capacity of trees left following partial cutting will receive attention.

Abell, Peterson, and Baker re-examined the 210 reproduction mil-acres on the selective logging plots at Franklin, Va. Sprouting data were taken on the hardwoods on five of the one-acre plots and on four of the one-acre study areas, one of which surrounds each plot. These data will afford further comparisons of felling, girdling, and poisoning as silvicultural measures. Residual loblolly pines on the plots bore very few cones, as determined by 100 per cent count, but on other trees within a mile seed-bearing cones were abundant. Progress photographs were taken from the permanent camera stations.

The reproduction quadrats on selective logging plots at Windsor, North Carolina, were examined and progress photographs taken. Cone counts on 100 loblolly pines taken at random on each of the four plots showed a meager seed crop on that area.

The 230 milacre quadrats on the controlled burning plots at Lanes, South Carolina, were re-examined and the dry weight of litter determined for selected milacres on both the burned and unburned areas.

At Drainland, South Carolina, the reproduction quadrats in open loblolly pine with heavy sod cover were examined. An acre of one year loblolly seedlings set out last spring (8 x 8) in competition with the heavy sod showed five per cent mortality. A similar plantation of slash pine had 58 per cent of their number beyond recall.

Forest Biology

Detailed observations on the bird life of this region and the collection of specimens of taxonomic interest were continued. Bird banding was carried on at the one station now established and for a

short period small rodents were trapped on the Bont Creek area.

Eight days were spent in surveying conditions, especially the waterfowl situation, in the Okofinokee Swamp in Georgia.

A trip was made to Richmond, Virginia, to confer with the State Game Commission on the deer situation in that State.

Forest Pathology

Phelps, in charge of pathological investigations since Nelson's transfer to the Forest Service, spent two weeks at Arcadia, Virginia, with Nelson and Sims, examining the burned-over plots on McFalls Creek. The plantations of oriental chestnut near Natural Bridge were inspected. The remainder of the month was occupied by work on the rather large culture collection of heart-rotting fungi.

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CALIFORNIA FOREST EXPERIMENT STATION

General

Most of the staff, with the exception of those on the erosion studies, have completed their field work for the year and are now deeply involved in an attempt to bring order out of the chaos of accumulated field data.

Forest Management - Pine Region

Mc. Clements and Hasel continued preparation of progress reports summarizing the latest periodic measurements for several permanent plots.

Mr. The Stanislaus Branch Station was closed for the winter October 15, Lloyd returning to Berkeley to summarize weather and growth records of the season.

The seedling height growth study showed that some seedlings continued growth as late as October 10. This was particularly true of lodgepole pine, which showed surprisingly uniform elongation from early spring until late fall. Diameter growth in all species practically ceased much earlier, although some trees showed minute increases until late fall. These late changes were irregular and so small as to be scarcely measurable with certainty.

Seeding of screened and unscreened plots was delayed because of failure to secure white fir and western yellow pine seed. The crop of these species was a failure in most localities. A good crop of sugar pine ripened this fall, the heaviest since 1920.

Reinke visited the station to remove the soil moisture recording instruments and take soil samples for their calibration.

Hasel and Dunning spent three days examining the cut-over lands of the California Door Company, Eldorado. At a recent conference of lumbermen, it was stated that this company was securing excellent reproduction of sugar pine in the sugar pine - fir type where no fir had been cut. Apparently the usual mistaking of advance growth for reproduction had occurred. There was nothing unusual about the proportion of sugar pine in the advance growth. No new seedlings of any consequence have become established since logging. One sufficient reason for this is very obvious. The pines have been cut to diameters of 16 to 18 inches. Practically no pine seed trees are to be found over large areas.

ME. Clements completed checks of three western yellow pine volume tables, R-5, Site IV and regional tables for 4.6 to 6.5 logs and 6.6 to 8.5 logs. Parker, of the Modoc, had measured 100 trees cut along the right-of-way of the Southern Pacific Railroad. The allocation of the trees to the proper site class could not be accomplished with certainty. The 10 tallest trees would throw the group into the 6.6 to 8.5 table, but this table gave volumes about 7 per cent lower than the scale. The R-5 Site IV table gave volumes about one per cent lower than the scale, the regional 4.6 to 6.5 log table gave volumes about 1-1/2 per cent low. It has been noted before that the height index for site is unreliable in the lava beds region, because the few tallest trees usually occur in local pockets of deep soil and may be a site class higher than the bulk of the trees.

Forest Management - Redwood Region

The time of Person for the month was about equally divided among the following: revision of Capper Report, work on the photographic records of the pictures taken during the past season, the study of redwood planting data, and an examination of planted areas within the Comptch burn of September 22 and 23, 1931.

The Comptch fire was one of the worst fires experienced in the redwood region for some time. The gross area covered was over 20,000 acres, about half of which suffered a very severe burn. The loss included eleven homes, a number of cattle, logging cars, and undoubtedly a great amount of wild life, particularly deer and quail. The remains of a number of fire killed deer were found.

All but about 50 of the 1840 acres planted by the Albion Lumber Company between 1923 and 1929 were within the burn. It is estimated that 90 per cent of the Douglas fir, but only about 10 per cent of the redwood, will die as a result of the fire. As 85 per cent of the planted trees were redwoods, the loss of trees will probably not be very great. Sample plots will be laid out in the planted areas to determine more definitely the survival according to severity of burn. The greatest loss will be to natural reproduction and seed trees and in the deterioration of site.

Cover Types

Hoaglin Quadrangle

The north half of this quadrangle was completed by the U. S. Geological Survey during 1930 and an advance sheet was available as a base for cover types. Mr. Jensen was assigned to map this unit of 468 square miles and completed the work during the period September 5 to October 28. In addition to types, sites were mapped as well as stocking on burns. The principal types are: western yellow pine - Douglas fir, pure Douglas fir, Douglas fir - white fir, and pure Jeffrey pine, the latter being confined to serpentine formations. Located in the heart of the Trinity National Forest it is typical of much of the National Forest timbered area in the North Coast Range. However, because of unusual accessibility the work was done at a surprisingly low cost, a summary of which follows:

Salary	\$176.50
Subsistence expense	79.50
Car expense	
1900 mi. at 4¢	<u>76.00</u>
TOTAL	\$332.00

Total area - 295,520 acres
Cost per acre - \$.0011

While on this job Mr. Jensen was able to check over the work of U. S. topographic mapping parties in the field on the south half of the Hoaglin quadrangle and found that they were doing an excellent job in mapping the major types.

Forest Influences (Erosion and Streamflow)

The preparation of installations to be in readiness for the coming winter rainy season have been the chief occupation of Lowdermilk, Rowe, Sinclair, and Sundling during the month.

The run-off plot installation at San Dimas was put in condition by Lowdermilk and Rowe. The vegetation on the burned plots was charted by Kraebel and Renner preparatory to reburning of the volunteer vegetation.

Baffle troughs of galvanized iron supported by boards were replaced by reinforced concrete to prepare for heavier run-off and erosion than the comparatively light rains of the past 5 rainy seasons have required. Concrete baffle troughs were also installed at Northfork. Heavy rains may come any year now, if on no other basis than probability. Run-off coefficients are expected to be much higher than have thus far obtained during the life of these experimental installations, and with heavier rains it is quite probable that important trends in results may take place.

Berkeley surficial run-off installation

In addition to the large lysimeters or soil tanks for studying the role of brush vegetation on yields of water from rainfall at Berkeley, a complete surficial run-off installation is being put in. Sinclair, who recently came to us from the Southern Experiment Station, has been occupied with this work in Strawberry Canyon at Berkeley.

The charting of vegetation within the chaparral zone by Kraebel and members of grazing staff has disclosed the remarkable fact that pack rats have browsed heavily on hazel bushes here. Practically every stem shows evidence of cutting and sprouting regrowth.

It is planned to make the Berkeley run-off installation as nearly a model as the lay of the ground will permit, not only for the demonstration of methods employed but in equipment which has been developed for these studies. It is believed that this equipment has been brought to a point where more general use in similar studies can be recommended.

Burns have been made according to schedule on the erosion and grass tanks at Berkeley by Sundlin. Run-off percents from soils derived from serpentine vary between 75 and 90 per cent, according to intensities.

Lost Creek Watershed

The Lost Creek fire on the Plumas National Forest last summer has presented a possibility for measurements of eroded material from a hard burn in high forest into an irrigation reservoir. Accordingly, a trip was made to this area in company with State Forester Pratt, Regional Fire Chief Price, and Director Kotok, and it was decided that conditions were favorable for such studies. Lowdermilk later went over the work with Rowe at Lost Creek and Rowe now has a crew establishing profiles across the tributary channels draining the burned and unburned portions

of the watershed into the reservoir. Gentle rains from cyclonic storms of early winter fortunately do not cause much run-off nor erosion. Heavy erosion is to be expected from rapid run-off caused by warm spring rains on snow. Combinations of rain intensities and temperature variations may affect the amount of run-off and erosion to important degrees.

Ecology

During September and October most of Kraebel's time was devoted to intensive recording of vegetation on the run-off-and-erosion plots installed by Lowdermilk in southern California, in the Sierra foothills, and in the Berkeley hills. Completion of this work was made possible only by enlisting the aid of our newly arrived staff of range management men at various times. Hormay first, then Renner, and finally even Talbot turned out to take part in the arduous job of charting the shrub cover on a new series of plots in the University grounds near Berkeley.

This latest series presented the rather formidable necessity of securing a complete and reasonably accurate map of all shrubby plants on six plots each 10 by 80 feet in size on a 50% slope in a dense cover of Baccharis and Corylus 6 to 12 feet high and thoroughly intertwined with blackberries and poison oak. The chart was supplemented with a list recording by five-foot squares all herbaceous species, ferns, and mosses, litter, animal activities, etc.

Of possible interest to other stations was the method devised for charting the dense brush vegetation by the use of wooden rods ten feet long by one inch square. These rods were marked off in feet and painted in bright colors in the manner of surveyor's sight rods, but with this exception, that, instead of using red and white for alternate feet, five different and contrasting colors were used, each five feet of rod repeating the same sequence of white, orange, blue, yellow, and red. With two such colored rods thrust through the brush across the plot on the contours and 5 feet apart, the cartographer is able to determine the location of any shrub with reasonable accuracy. Instead of having to look for numbers or letters to identify the foot distance of a plant from either side line, he has only to distinguish the color of the foot to which he is referring, and this he can do if only an inch of the color shows through the tangle. By means of a graduated five-foot rod carried in the hand the location between contour rods is obtained. In practice this method has proved fairly rapid and quite satisfactory.

Fire Research

Visibility Mapping

During the latter part of the month visibility mapping was resumed to get several points which had been deferred until a new road project

under construction was completed. Visible areas from three other points were also mapped, which gave promise of detection value. This completes the field data for the working up of a detection scheme for the remainder of the experimental forest. The same method will be used that was evolved last winter in making a detection plan for the Sacramento Canyon unit. This will give us an interesting test of the method. The country represented, which comprises chiefly the McCloud and Pitt Ranger Districts of the Shasta Forest, has less fire business than the Sacramento unit and with fire risk and hazard zones less clearly defined.

Lookout Observation Charts

As the end of the lookout season approached, most of the lookouts who had been using the observation charts were visited. The object was to check on their methods of observation and recording for later reference and to obtain their personal reactions to the idea. These inspections proved valuable. In general observations were very carefully made and nearly every man had some ideas to contribute as to ways of improving the method.

There was considerable variation as to their opinion of the value of an observational chart in detection. Some of the "old timers" were flatly opposed to the idea as an aid to detection. Others went us a step farther and developed a careful "directory" for the eye to insure the covering of dangerous country that they knew by experience a new man might miss. The newer men accepted it as a routine part of the job without much comment.

Although most of the charts were installed rather late in the season we will have nearly nine thousand recorded observations of changing visibility of defined natural target points. These will be studied and an analysis attempted this winter.

Visibility

Film slides of graduated densities were tried out as a means of measuring visibility with the idea of developing a technique of observation and to determine the value of this method of approach.

By using 1/50 second of exposure on a blank film as the unit, nine graduations were available. These gave a very well defined series of "stepped down" visibility.

As a test, the target points of the chart used by the Girard lookout were tested at hourly intervals to determine the vanishing point of each in density of film for comparison with observation by eye.

A series of smoke candles were set at mile intervals in distance and the smokes tested also as to their vanishing point. This was with the idea of obtaining a comparison of the visibility of smoke and that of the typical natural targets used for the observational charts.

Incidentally we obtained a very good trial of smoke candles and a comparison with natural smoke set immediately after. The smoke candles performed admirably when there was little or no wind.

Binocular study

During the past month several additional binoculars have been obtained and tested. In the meantime, the technique of testing has changed to some extent. Instruments are now being graded on the following qualifications; magnification, width and quality of field, illumination, adjustments, strength and workmanship, relief, steadiness, resolution, and color aberration. New targets were developed for the magnification, field of vision and resolution tests. The first two target tests are quite satisfactory, but a new line of approach on the resolution test has been found necessary.

Through the courtesy and cooperation of the Division of Optometry of the University, permission has been obtained to construct a collimator in the work shops of the Division. Both mechanical and optical axes of binoculars must be in close adjustment to eliminate eye strain. The collimator is designed to test this adjustment. It is planned to use the collimator not only for determining the adjustments of new instruments but also for the periodic examination of all Regional Forest Service binoculars.

The Station has been requested to prepare a set of specifications for Service-wide use as a result of the equipment meeting held in Spokane early this month. These specifications have been prepared and will be available shortly with a progress report on the binocular study.

Grazing

Work done during October by the grazing staff, Talbot, Renner, and Hormay, may be summarized as follows: Various classes of information relating to the range problem in California, were assembled and filed for future use. Preliminary discussions of the grazing problem and of future plans for handling it, were held with the Director and with representatives of the Regional Office and of the University. Assistance was given Lowdermilk and Kraebel in establishing run-off plots, and some time was spent in the study of the relation of their work and methods to the grazing studies.

A short preliminary field examination of grazing conditions and vegetation in the eastern foothills of the San Joaquin Valley was made

under the direction of W. R. Chapline, of the Washington Office.

A similar local examination in the pine types on the eastern slope of the Sierras was made in company with R. W. Beeson, of the Regional Office, and Chapline.

Shortly before leaving, Mr. Chapline spent some time with Renner in the further consideration of two manuscripts on which he is working. It is expected that both the "Range Bibliography" and "the Boise Range-Erosion Survey Report" will be completed shortly.

Products

Woods and Mill Study

One of the major objectives of the Stanislaus Woods and Mill study, in which the identity of each tree was maintained all the way from stump to green chain lumber tally, was to obtain a comparison between tree values derived via the "physical tie" or direct method, and those computed by the "built up" or indirect process. It is difficult and costly to follow individual trees from their source to the sawmill and to synchronize woods and mill investigative activities under the usual type of operating conditions found in the California Pine Region, but it is comparatively simple to analyze the economics of a lumbering operation by conducting the logging study and the milling study independently of each other. It is evident, therefore, that such a comparison is decidedly important as a guide post for pointing out the course which future studies should take.

The values for sugar pine trees worked out by the two methods are shown as follows:

Values per M feet mill tally, 5 Com. & Better
Sugar Pine Trees
Results by direct and indirect methods compared

DBH	Value per M by	
	Direct Method	Indirect Method
20"	\$ 22.15	\$22.15
22"	22.70	22.80
24"	23.40	23.65
26"	24.40	24.60
28"	25.60	25.50
30"	26.75	26.50
32"	27.80	27.60
34"	28.95	28.65
36"	30.25	29.75
38"	31.65	30.80
40"	33.05	32.10
50"	40.20	38.10
60"	45.20	43.30
70"	47.40	46.80
80"	47.50	48.50

The differences are so small in the range of sizes below 38 inches DBH that there is obviously nothing to be gained from the standpoint of greater accuracy through the use of the direct tie method. This is the important range, too, as far as the economic size limits are concerned. Both methods of evaluation place the zero margin, or economic DBH limit, at the same point, - about 23 inches for the Stanislaus Study area.

For 50-inch trees, the direct method gave a value \$2.10 higher than the indirect, which is the maximum differential between the two, the curves crossing again above 70". It would require too much space to give the reasons why this differential occurs in the larger sizes and still more to explain why the indirect curve is undoubtedly the more truthful of the two in respect to average values for a logging unit of a size large enough to be of real significance from a regional viewpoint. Suffice it to say here that the indirect method appears to offer opportunities for more reliable, more comprehensive, and quicker results in future economic studies than the direct method besides having the important advantages of much lower project costs.

White Fir Depreciation Study

Brundage and Mason went to the Fruit Growers Supply Company sawmill about the middle of the month to take down the special study piles of white

fir erected just before the first of August. Drying conditions have been very severe, the lumber reaching a moisture content of seven per cent in about two months' time. The material is all being run through the planer and part is being remanufactured into dimension and ship-lap. Indications are that the degrade is even greater than reported by the lumbermen.

Consulting Entomologist

Field work on the Insect Control Survey, which was terminated on October 24, showed the infestation by the western pine beetle in the western pine type of the Sierra and southwestern Stanislaus National Forests to be in a highly epidemic state. Recommendations for control work in portions of these two forests have been made and \$10,000 has been allotted by the Forest Service for fall operations which are now under way. J. M. Miller is supervising the technical phases of the work.

Regional Survey studies carried on during the past field season resulted in the completion of the field work on ten permanent plots in the Modoc and Sierra National Forests. Studies of infestation by the western pine beetle in other areas that are to be covered by the survey studies in the future will be greatly facilitated by data obtained from additional plots cruised by the control survey crews.

Studies in white fir insects have shown that the fir balsam is repellant and very toxic to adults of the fir engraver beetle. Control studies in which logs infested by the fir engraver beetle were submerged in water, revealed that it was extremely difficult to kill the broods in this manner.

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CENTRAL STATES FOREST EXPERIMENT STATION

General

With the termination of the active field season, the members of the Station staff have spent most of their time in the office for the past month, analyzing data and writing reports.

The Director has spent half of the month in the field, becoming familiar with the forest conditions and acquainted with the cooperators of the region. A trip through western Ohio, Indiana, and eastern Illinois was made with Day, looking over the plots established in the

woodlot grazing study. At Wanatah, Indiana, the grazing experiment carried on cooperatively with the Purdue Agricultural Experiment Station was inspected, in company with Dean Skinner, members of the Agricultural Experiment Station staff, Professors Prentice and DenUyl of the Purdue forestry faculty, and Extension Forester Shaw. Conferences have been held with the following members of the Research Council: Chairman Anderson of Cincinnati, Ohio; R. T. Houk of Dayton, Ohio; J. H. Skinner of Lafayette, Indiana; E. N. Transeau of Columbus, Ohio; State Forester Wilcox of Indiana; State Forester Secrest of Ohio; State Forester Miller of Illinois; State Forester Jackson of Kentucky. Inspections have been made of the Wooster arboretum plantations with State Forester Secrest; the Champion Paper and Pulp Mill at Hamilton, Ohio with Chairman Anderson; and the Morgan-Monroe State Forest in Indiana with State Forester Wilcox, Kellogg, and Day. Several days were spent in Washington conferring with officials of the Branch of Research and with directors of some of the other Forest Experiment Stations who were engaged with work on the Extensive Revision estimate.

The annual meeting of the Ohio Valley Section of the Society of American Foresters (October 29, 30, 31) afforded the more recently appointed members of the staff an excellent opportunity to meet many of the foresters of the region, and to become acquainted with the forest conditions of central Kentucky. The trip started in Louisville and extended through the Bernheim Estate to Mammoth Cave. Baker, Auten, Hall, Kuenzel, and field assistants Cummings and Diller attended the meeting. On the return trip Baker and Diller visited the Clark County State Forest at Henryville, Indiana.

Our sympathy is extended to Day, who was called to Washington, D. C. by the death of his father on October 22. He returned to Columbus on November 1.

Baker attended a meeting of the State Water Conservation Board at Columbus, Ohio on October 14. This organization is studying the problems of water conservation, flood control, and soil erosion in Ohio.

Considerable time has been spent during the past month to build up a comprehensive mailing list of cooperators and interested organizations and individuals within the Central States region. It is planned to publish periodically a "progress report" which will be distributed for the purpose of acquainting cooperators and interested persons with the work of the Station. The first report will appear during November.

Plantation Project (Fp-1)

Black Walnut Litter

The cooperative work carried on with the School of Forestry at Ames, Iowa has been continued during the recent summer and autumn.

Graduate assistance has been given by the Department of Botany at the same school. The leaf traps for the periodic collection of walnut leaflets were set out on June 14 and collections were weighed and samples dried for moisture content at intervals. The data gathered substantiate the observation that leaf fall in planted black walnut begins in early summer soon after the leaves reach their full size, and that it continues on through the season until frosts bring down the balance of them. Following are the figures through October 8.

balance of them. Following are the figures				
: Oven Dry Weight of		: Cumulative Total		: Moisture content
Period	: Leaf Fall Per Acre	: Leaf Fall per Acre		: during Period
Days	: LBS	: Tons	: LBS	: Tons
				: Per cent
44	: 140.30	: 0.070	: 140.3	: 0.070
7	: 49.69	: 0.025	: 189.9	: 0.095
7	: 35.47	: 0.017	: 225.5	: 0.112
7	: 59.83	: 0.029	: 285.3	: 0.141
36	: 619.48	: 0.309	: 904.8	: 0.450
6	: 49.16	: 0.024	: 953.9	: 0.474
10	: 363.28	: 0.181	: 1317.2	: 0.655

No frosts to date.

It is doubtful whether black walnut ever bears sufficient leafage to develop a litter were the entire amount of leafage to fall at one time. This habit of dropping leafage throughout the summer is an added factor preventing the formation of litter. Good silviculture indicates the need of a tolerant understory capable of developing a litter and maintaining the site.

Black Walnut Yield

Kellogg continued the compilation of black walnut yield plots. He finds that the best site produces 22,750 board feet (International rule) at the age of 75 years and that the poorest site scales 2,600 board feet at the same age. The best three sites show volume at age 15, the fourth at age 20, and the poorest does not contain board footage by this rule until age 30.

By the Scribner rule, to a ten-inch top (which approaches current cutting practice), the best site shows 9,700 board feet at age 75 and the fourth site class shows only 180 board feet at the same age. The poorest site class shows no footage within the age limit of this study. Scribner Volumes to the above limit appear at ages 30, 35, 40, and 50 for each site respectively.

Kuenzel spent some time on stem measurements of fence row black walnut, checking the plotted points and curving them. It is planned

to compare the volumes of these trees with those grown in grove form.

Black Locust Yield

In the early part of October, Kuenzel computed areas of the black locust yield plots which were taken last summer. The planimeter and the double-meridian-distance methods were compared in this work. With the aid of a Marchant calculator and a form for recording traverse data, the D-M-D method proved as efficient and more accurate than the planimeter. Where plots were plotted on a small enough scale to allow tracing with one set-up of the planimeter, this method was most rapid; but where two or more set-ups were required, the D-M-D method proved speedier.

Chestnut Oak Regeneration Study (Ts-12)

In 1929 plots were established in southern Ohio and southern Indiana to discover the reasons for and the time of failure of seedling crops of chestnut oak; to obtain data on the growth of seedlings during early life; to observe the effect of various depths of leaf litter on the mortality and growth of seedlings. This fall a recount of seedlings by Day and Kuenzel on the quadrats at Crystal Springs and Rock House, in southern Ohio, yields some information on the survival of seedlings.

Quadrats established on areas of deep forest litter showed the greatest mortality of seedlings since the last observations made in June, 1930. The density of overhead shade also appears to be a factor in the survival of seedlings, as indicated by the seedling count on two adjacent quadrats, one with overhead shade of 0.15, (basis of 1.00 equals full shade) and the other with overhead shade of 0.80. A significant increase in the percentage of survival took place with the increase in density of overhead shade.

Further observations and recounts planned for are necessary before any conclusions of value can be made from this study.

Litter Study M-1

Auten spent the month in statistical computations of data on soil porosity gathered during the summer season and in preparing a manuscript for publication.

Extensive Revision

Progress is being made on the commodity drain report. Kuenzel has interviewed officials from the various States within the region and is now compiling the data available.

Locust Borer Investigation

The early part of October was spent by Dr. Hall in concluding field work in connection with the establishment of sample plots. During the past season a total of 279 sample plots were established in all. 179 of these were intensive plots and the remainder were of an extensive character.

The latter part of the month has been devoted to a preliminary analysis of these data. Curves for the determination of site index have been completed and the site index for each sample plot has been determined. All plots have been separated on the basis of site index and the relationship between site index and injury has been determined. Also the data for all the intensive plots have been separated on the basis of crown class and injury.

An analysis of these data so far has demonstrated that a very close relationship exists between site and injury by the locust borer. When based upon site index, the relationship is an inverse one; the higher the site index, the lower is the amount of injury. This confirms the opinion formed from general observations during the collection of the data.

There appears to be a definite relationship between crown class and injury by the locust borer. Age affects this relationship, however, and we find a different relationship existing in early life from that in later years. Up to ten years of age the relationship between crown class and injury is as follows: the dominant class shows the highest percentage of injury followed by the codominant, intermediate, and overtopped. The last group shows the least amount of injury. After ten years of age the relationship reverses and we find the overtopped class showing the highest percentage of injury and the dominant class the lowest.

Woodland Grazing Project (Pa-1)

With the exception of a week's inspection trip with Baker in the early part of the month, Day has given his entire time to the compilation of the permanent sample plot data secured this summer. A portion of this data can be incorporated directly into the bulletin on the Regeneration of Farmwoods which Day and DenUyl are preparing. The publication of this paper is being held up for the inclusion of this material.

The October first weighings of the livestock at the Pinney-Purdue Farm showed a gain for practically all animals, indicating that the heavy loss during the latter part of September was due largely to the excessive heat and the bad fly season. It was decided that the animals in both the twelve and eighteen-acre tracts should remain in the woods until the close of this year's tests on November first.

The utilization of forage on this date was about 90 per cent in the twelve-acre tract except for *Corylus* and *Rubus*. The hazel appeared to be about 60 per cent utilized and the blackberry about 80 per cent. In the eighteen-acre tract, utilization on this date was about 80 per cent for everything except *Rubus*, *Prunus*, and *Hicoria* which were about 60 per cent and *Corylus* which was about 40 per cent. For some reason, the animals appear to be turning from the blackberry to the hazel in both tracts. On August 11, Dr. Cain reported that the blackberry had been entirely utilized in the twelve-acre tract. On October first, however, considerable new leaf growth was noticed which had not been cropped.

Dr. Cain visited the farm about the middle of the month to check up on late summer and fall vegetation, but found that the season was too far advanced to secure an adequate census or accurate identification. He is of the opinion that one examination about the middle of the summer will be sufficient to secure all but a very small percentage of the vegetation.

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INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION

(September and October)

Forest Management

The field season was brought to a close by the remeasurement of the Salmon method of cutting western yellow pine plot, making a total of 20 5-acre plots measured under this project the past season. These plots are now being compiled and analyzed by the individual tree coding system and ample data has been secured to furnish numerous combinations to picture growth, development and characteristics in this region.

The study of the effect of ground and crown cover on snow recession will be continued next spring. The plots and points of measurement were surveyed and staked this fall preparatory to spring work which consists of regular mapping of the rate of snow melting and snow measurement of depth and water content at set stations following each melting day.

Mr. Munns of the Washington office, in September, paid his first visit since the Station was established. Among other matters he aided in the consideration of a western yellow pine experimental forest. The selection is now confined to the choice of two desirable areas. These areas, one in the Boise Basin and the other on the South Fork of the Payette River, have been examined and reported; the former being the most suitable if an exchange can be made to bring additional adjacent lands within the boundaries.

Erosion and Streamflow

Director Forsling spent the first two weeks of September in Region 6 during which he accompanied Director Munger, Assistant Regional Forester Kavanagh and Mr. Dutton in an examination of areas where watershed difficulties had been encountered on the east slope of the Cascades in Oregon and Washington.

The field work of the Utah flood survey by Deming of the Station and Professors Bailey and Becraft of the Utah Agricultural College is practically completed. Considerable interest is being shown in the work. The mayor and the board of commissioners of Salt Lake City and the county commissioners of Salt Lake county have each made special requests that the watersheds in which they are interested be given special attention. A special report will be prepared for each of these organizations.

The preliminary extensive erosion survey of the upper Colorado River watershed is about complete. Part of the territory was covered in connection with the Utah flood survey. Field work has been continued by Mr. Deming in Wyoming and Utah. Jay Higgins, Forest Supervisor of Region 2, has covered the west slope in Colorado. One of the outstanding conclusions from the preliminary observations are that beginning shortly following the occupation of the territory by white man, erosion has been very greatly accelerated. Washes often 100 feet or more in width and a few to a hundred feet in depth are now to be found in what at the time of settlement were flat grass-covered drainage bottoms. There are many signs of sheet erosion on the watershed slopes. There appear to be but two plausible causes of this accelerated erosion, one of which is climatic change, the other is disturbance of plant cover and other natural conditions. Of the two, climatic change seems the least probable, at any rate there is extensive evidence that depletion of the cover is the primary cause. However, these are points for future study to decide and circumscribe.

Boise Erosion Project

The 1931 field season for the Boise erosion project closed October 21 at which time Craddock and Pearse returned to headquarters in Ogden, Utah. During the season the vegetative studies on the watershed were materially strengthened by the establishment of several new major plots and quadrats. Some of the new plots were established on newly fenced areas and others were placed on sites which had already been partly investigated but which needed additional control. Mr. L. E. Spence, collaborator from the University of Idaho, assisted Pearse and Crook in this work. A large number of soil samples were taken from a variety of sites over the watershed which will be analyzed this winter in an effort to trace the original soil profiles. In addition to the vegetative and soil studies, an extensive fence program was carried on through the entire season.

Mr. Truscott of the Region 4 office of Maps and Surveys rechecked a number of the grid and gully profiles in September. A preliminary inspection of the notes would seem to indicate there has been little erosion on the plots since they were established two years ago.

Mr. Murray and Mr. Bolscheidt, of the Biological Survey, continued their poison campaign in and about the recently constructed rodent-proof exclosures.

Further consideration was given while Mr. Chapline was here in October to the selection of a site for the central field headquarters for the erosion project. Recent prospective developments involving land exchange between federal, state, and local bureaus and owners has suggested the possibility of combining the grazing-erosion headquarters with that of the silviculture studies within the proposed yellow pine experimental forest. Another site in Fall Creek offers many good features, although it is more inaccessible than is desirable.

Great Basin Branch (summer range)

Field Assistant E. C. Crafts left the Station on September 12, to return to the University of Michigan. Field Assistant E. R. Crook of Michigan State Agricultural College reported on September 20 from Boise, where he had been on erosion studies with Craddock.

Miss Sylvia Griswold left the Station, to return to the University of Chicago, on October 22, after spending a field season on her thesis "The Role of Seed Germination in Plant Succession."

Preliminary field work was started on a carbohydrate metabolism study of several forage species. This study is in cooperation with Dr. E. C. McCarty of Riverside Junior College at Riverside, California. A total number of 158 plants, of which 119 were Lettermann's needlegrass (Stipa lettermannii) 14 violet wheatgrass (Agropyron violaceum), 15 many-flowered brome (Bromus polyanthus) and 10 wild geranium (Geranium viscosissimum) were dug up and the roots thoroughly cleaned. The plants of Lettermann's needlegrass were collected from major plots in the Alpine cattle pasture which have been grazed under different intensities for the past several years. One set of plants of the above species was collected from a permanent ungrazed enclosure. One set of root samples of each of the three species were dried under natural conditions, a second set was preserved in benzol and a third set in grain alcohol, as a means of determining how the collections may best be preserved for transportation to the laboratory for analysis.

During September the last rodent proofed exclosure was completed. This makes four rodent proofed exclosures at different elevations, namely, one in the oak-sagebrush type (7400 feet), one in the snowberry-sagebrush type (8500 feet), one in the pentstemon-grass type (9000 feet), and one in a weed type at (9600 feet). An opportunity will be afforded to note the damage by snow on this type of fence, especially at the higher elevations.

Meetings

County Agent Smith of Nephi, accompanied by 19 4-H Forestry boys spent September 4 and 5 at the Station. The first day was spent at the headquarters station, observing the various experimental plots, and getting acquainted with the trees, browse and herbaceous species in the intermediate vicinity of the Station. The following forenoon was spent in a field trip to erosion area A at Alpine. This meeting is an expression of a recent move in the state, largely initiated by the Extension Forester, to interest the young folks of Utah in a better knowledge of the natural resources of the state and their management.

1931 Summer Drouth

Extreme drouth conditions prevailed during the past summer growing season at the Great Basin Branch. A comparison of the summer seasonal precipitation (June 1 - August 31, 1931, inclusive) for the three vegetative zones, namely the Transition (oak), the Canadian (aspen-fir), and the Hudsonian (spruce-fir), shows that a new low record was established for the two lower zones. While there was a material deficiency during the summer growing season in the Hudsonian zone, it did not approach the low record established in the summer of 1928.

The summer seasonal precipitation in the lower zone amounted to only 31.8 per cent of the 17-year mean, in the middle zone 39.6 per cent, and in the upper zone 63.4 per cent. Such a deficiency in summer precipitation greatly reduced the range forage production.

Winter Range Studies

During September and October, Dr. Stewart, Mr. Pickford and Mr. Hutchings, made two semidesert studies on the winter sheep ranges of western Millard county, Utah.

One study was a transect across a belted vegetation in which greasewood, shadscale, white sage, black sage, and juniper occurred in well-separated, almost pure stands. Transitional vegetative types also occurred on margins or as "islands" in nearly pure stands. Stations were established every 200 feet through a strip about four miles long and a strip of vegetation 100 feet wide was mapped. Estimates were made of densities at the stations and surface soil samples were drawn for alkali test. Differences in elevation were also determined. Eight pits were dug to a depth of six feet and soil samples were drawn for laboratory study during the winter. Though the data have not as yet been studied, there seems to be a correlation between alkali content and differences in elevation on the one hand, as compared with the distribution of desert plants on the other. Details must, of course, be worked out after laboratory study.

The other semidesert study began, was regarding growth of shadscale and white sage. These data must also be calculated. Some areas received more rain than others. A few data regarding shadscale where there had been a good rain in one case, and a very light one in another, are as follows:

	<u>Good Rain</u>	<u>Light Rain</u>
Maximum height of plants	23.22 cm.	11.26 cm.
Average height	17.34 "	8.94 "
Average width of plants	27.59 "	13.76 "
Shoot growth	11.01 "	4.07 "
No. lateral twigs per shoot	5.24	2.31
Average length lateral twigs	2.36 cm.	.66 cm.
Average diameter of leaf	.55 "	.31 "

From October 20 to 23, inclusive, Director C. E. Forsling and Mr. W. R. Chapline, Branch of Research, accompanied Dr. Stewart and Mr. Hutchings in a general inspection tour of several prospective sites for experimental range studies. More detailed study of two of these sites are now being made.

Dr. Stewart accompanied by Supervisor McQueen of the Humboldt Forest, spent the week of October 27 to November 3 studying desert vegetation in eastern Nevada. Near Tonopah there was an excellent growth of grass and shrubs. In other parts there was little growth.

Biological Relations

Early in September Mr. Locke described the work of the experiment station in animal relationships at a meeting of the State Game Department officers for Idaho. Following this an airplane trip with the State Game Warden over the game ranges burned over indicated that a small amount of essential winter range was damaged.

Additional data was obtained regarding pocket gophers on the Boise River drainage. Excavation of pocket gopher runs indicated the need of stomach studies to determine food habits to supplement data obtained from food stores, due to the extreme depth at which these latter occur.

During October Mr. Locke visited the Middle Fork of Salmon River deer study area with representatives of the Forest Service, State Game Department, and Bureau of Fisheries. Following this an interesting experiment in planting of sago pondweed seed was carried out on the Sawtooth National Forest. This planting at Pettit Lake was made over a bottom which naturally supported a slight growth of vegetation but half of each of two plots planted was fertilized by the addition of bone meal.

NORTHERN ROCKY MOUNTAIN FOREST EXPERIMENT STATION

Silvicultural Studies

The important silvicultural job in October was the planning and installing at the Priest River Station of a detailed series of quadrats to be used in an instrumental study of the factors of site affecting seedling survival in the white pine type. Haig gave most of his time to this work with some help from Thompson.

The general plan of this study is to follow survival in three measured environments, full sun (clear-cut), half-shade (half-cut) and full timbered. The installations in each case will be adjacent to and really extensions of the inflammability stations used in studying fire danger and upon which the important meteorological factors are being measured in great detail. Each installation will contain a series of natural quadrats with mineral soil, burnt mineral soil, and duff surfaces; a series of artificial quadrats, trenched, watered and blackened (with powdered charcoal); and a series of control quadrats in soil boxes 10 inches deep and 14 inches square in which water content will be under control and upon which available sunlight and soil surface temperatures will also be regulated by shading.

Each quadrat will be sown to the principal species common in the western white pine type, with the possible exception of white fir, in sufficient amounts to give approximately 500 live seedlings of each species on the natural and artificial quadrats and about 300 live seedlings each on each control or soil pan test. The soil pan tests will probably be restricted to sowings of western white pine and western red cedar (one typically sturdy and one typically frail seedling) during the first season's trials. Each quadrat, except the trrenched one, is in duplicate to reduce experimental errors and increase the dependability of the results.

These installations will enable survival figures to be compared to environmental conditions in which the important factors of site, particularly soil moisture, soil surface temperatures and sunlight, will be segregated as far as possible and their individual effects on survival measured. A knowledge of the role played by each important factor in early survival will enable us, of course, to interpret more accurately reproduction conditions on our permanent methods of cutting and reproduction plots and reach a better understanding of the results of various silvicultural treatments in the western white pine type.

The selected areas have now been cleared of stumps, down logs, rotten wood and similar debris (a formidable task which took about one and one-half man months of labor) and are now ready to enclose in a cattle and rodent-proof fence. Sowings of western white pine and western red cedar have already been installed, it being essential of

course to sow the white pine seed this fall in order to secure a reasonable amount of spring germination. These installations have been covered with screening and the areas poisoned to prevent rodent depredations. Installations of Douglas fir, western larch and western hemlock will be made in the spring. Lowland white fir will not be sown due to the infertility of this year's crop and the consequent lack of seed.

Silvicultural manuscripts took up some time in October, Weidman giving about half of the month and Haig about a week to this kind of work. Haig's white pine yield manuscript is now typed in final shape and will be forwarded to Washington for Branch review within the next few days.

Misses Bouchard and Fain continued compilation work during October on current records taken on permanent methods of cutting, reproduction and yield plots and it is believed that it will be possible to bring these records up to date during November.

Analysis of the Fire Records

Compilation of the fire records for the 13 western forests was continued during October with only one clerk instead of two as heretofore. Progress was further retarded by the necessity of recomputing the timber type areas for all 13 forests in order to separate the alienated from the Federal lands inside the forest boundaries; as required by the new fire summary sheet, L-M. In addition Mr. Richards and one clerk, supplied by Operation, compiled the type areas for the eight eastern forests by planimetering the areas from the silvicultural type maps.

The proper method of determining the type areas as a basis for fire control needs is an open question and an important one. If an area of 5,000 acres of larch-fir contains numerous small patches of yellow pine, and white pine, none of these patches being over 40 to 100 acres in size, should they be added and tabulated separately or should they be included as larch-fir, and the whole 5,000 acres be given the larch-fir type rating? If none of the patches were over 10 acres it seems probable that there would be no question of their status; they would be included as larch-fir because special protection would not be economically possible. A patch of 500 acres of white pine inside a general larch-fir type, however, probably would be recognized and deserve more intensive protection. The question is where to draw the line, according to size of the patch, which will determine whether the patch should be tallied separately or included as part of the surrounding type. Until this question is settled there are certain to be considerable differences in protection ratings between Regions and between Forests which are not real differences, but are due merely to methods of mapping and compilation.

During the month Hornby and Gisborne began the design of a new punch card and code to suit the new fire report, Form 929. As was expected this is a difficult task. The new report contains more information than can be coded on one 80-place card, and the card or cards must permit sorting and tabulating to provide information as called for by Sheets A to M.

Weather and Inflammability Studies

All measurement stations at Priest River were dismantled early in October by Gisborne and Jemison, except the control weather station which is operated throughout the full year. Instruments were cleaned and repaired, wood cylinders and duff hygrometers sent to Missoula for recalibration, and everything prepared for recommencing measurements next spring.

Since his arrival in Missoula Jemison has practically completed the transcribing of weather records for the Priest River Station from 1912 to date. These data are to be summarized, tabulated, and charted so that information can be conveniently obtained concerning questions of phenology, silviculture, and fire control as they are affected by the weather. Visiting foresters, especially foreigners, almost invariably demand information concerning the climate prevailing at Priest River, as a basis for their opinions of forest growth. Our records which now cover 20 years can be made to satisfy this demand and to serve many other purposes when properly compiled.

Jemison has also redried all of the wood cylinders used in measuring wood moisture content at Priest River. A comparison of this redrying with those of other years, since 1926 when this work was first commenced, shows that sticks two inches or less in diameter by 18 inches long lose from 1% to 4% of their oven dry weight each year, the least loss occurring in the larger sized pieces and the most in the half-inch diameter cylinders. After five years' exposure the two-inch sticks are now losing about one-half of one per cent per year. How much of this loss is chargeable to weathering and leaching, and how much is due to oven-drying (with the temperature carefully held under 100° C) has not yet been determined. Likewise, the loss due entirely to decay has not been ascertained. The curves showing loss of weight by years do not indicate that decay has commenced as yet, even though some of these cylinders have been continuously exposed since April 1926.

One very interesting point brought out by this work is the finding that the average moisture contents of two cylinders, one western yellow pine sapwood and one Douglas fir, shows almost exactly the same average moisture contents for the period June 20 to August 31, 1931, the averages being 7.89% and 7.85% respectively. This is after correcting both sets of measurements according to the oven dry weights recently determined. As we have found greater differences between individual cylinders of western yellow pine it appears that variations in hygroscopicity within that species may be more important than the difference between some samples of pine and fir.

A punch card form and code for the inflammability and weather data obtained at Priest River during the past eight years have been prepared in preliminary form and coding of the data should commence in November. This work is the continuation of the project covered by Gisborne's progress report "Measuring Forest Fire Danger in Northern Idaho". With the large volume of measurements now available it should be possible to refine and to determine with much more accuracy the relations between duff moisture and each of the weather elements, and to determine these relations for wood moisture as well.

In addition, the new punch cards will carry a rating of the degree of fire danger prevailing for these days that can be rated on the basis of behavior of actual fires, during the last eight fire seasons. This will permit grouping all cards for each class of fire danger and the determination of the average temperature, humidity, wind, evaporation, days since last rain, duff moisture, and wood moisture which prevailed. These determinations can then be used in the future for rating the class of danger existing even though no fires are burning. The hard part of the task is obtaining an agreement among experienced men concerning the classification of fire danger. How many classes to recognize and what criteria to depend upon are not as simple as they seem. The daily telegraphic reports of fire conditions for the Kaniksu and Pend Oreille Forests are available to indicate the character of each day, but full use also will be made of other information such as the detailed study of the Quartz Creek Fire in 1926, and the rating of each day in August 1929, two previous fire studies.

Transportation, Visibility and Allied Fire Control Studies

Hornby spent most of October on the Clearwater Forest lining up various phases of the transportation and visibility studies with Calkins, Yule and White, who have been assigned to the work by the Regional Forester. The Clearwater Forest is the first unit on which these studies are being conducted.

The essential object of these studies is to determine the most effective location and movement of man power in fire control. The work may be divided into four phases as follows:

- (1) Interpreting the Results of Fire Statistics. Based on the analysis of 12,000 fires, a considerable volume of data is being assembled covering timber and fuel types, rate of held fire line construction, fire control improvements and man power in effect during the past 10 years. H. R. Richards has been on the office compilations of this work for about a year through assignment by the Regional Forester. Due to absence of cases and failure to record factors necessary to use in planning, considerable interpretation of data is required using experience records outside of the statistics.

(2) Road planning for Second Line Defense. The completion of this phase of work ahead of the others is necessary in order to utilize roads for detection and smokechasing to the extent that they will give the most economical results. H. A. Calkins, of the Office of Engineering, is at present giving his entire time to this work.

(3) Visible Area Mapping. At present it seems desirable to map the visible areas from about 50% more points than will probably be found necessary to meet the visible area standards. The location of detectors to yield the desired amount of visible area with the fewest possible points lies within a much more restricted field of possibilities than the location of smokechasers needed to meet desired travel time standards. The Office of Engineering has contributed the time of J. B. Yule to this phase of the work.

(4) Determining Detection and Smokechaser Locations. Detectors are also smokechasers. After the smokechasing limits of detectors are tentatively set, the areas not covered within the travel time standards will be assigned to the most advantageous smokechaser locations. The men to occupy these positions will be detectors and their visible areas are mapped into the picture. Adjustment then becomes necessary in order to meet both standards with the fewest possible positions. Roads constructed for both first and second defense contribute a large amount of detection and at the same time make for reduction of smokechasing travel time.

W. I. White, previously Assistant Supervisor on the Flathead Forest, is devoting his entire time to this phase and to assembling cost data, exclusive of roads.

Relation of Fire Perimeter to Area

For planning purposes it is necessary to know the size of the firefighting job that should be expected at first arrival. The first consideration is perimeter of the fire. Various perimeter lengths exist with the same area, the smallest being that of a true circle, the largest that of a narrow rectangle with almost no width.

Hornby has made random selection of 100 cases below six acres from actual fire reports. These were plotted with perimeters as ordinates. The curve of a rectangle ten times as long as wide was found to be high enough in this field to include 90% of the cases, which is considered sufficient.

The active part of a fire perimeter, that needs to be worked on immediately, seldom exceeds one-half of the total. One half probably is sufficient to use in planning. The curve plotted should be dropped to one-half its ordinate values throughout. When this is done the new curve falls approximately on a path representing the perimeter of a true circle at different sizes.

Equation of the top of the field is $Y^2 = 48.4 X$
Equation of the bottom of the field is $Y^2 = 12.5 X$

Stated briefly, 90% of fire perimeters in relation to areas lies between one and two times the circumferences of a circle and the half perimeters of the maxima are equal to the circumferences of true circles.

The question might be raised why it is permissible to assume the shape and equation of this relation. The answer is that no matter what shape of fire is assumed the relation of perimeter to area in different sizes of the same shape, produces an equation of the second degree in two variables. This specifies a conic section curve, which in this case must be a parabola. The only concern need be to raise the parabola high enough satisfactorily to cover the field of cases. When it is recalled that the conditions here considered deal with whether or not the attacking forces can control a fire, the importance of further study and classification of cases is evident.

Logging-Milling Studies

Anderson was successful during the month in planning, organizing the crews, and getting the field work under way in two studies that had been planned for the summer.

The first study was made to obtain detailed information on the cost (time and output) by tree sizes of chuting small logs from the back end of a western yellow pine-larch fir logging chance. This information is necessary in order to obtain accurate figures on the cost of producing stull and mining timbers from the western yellow pine-larch fir type in western Montana. Stands of this type are being almost clear-cut to provide round mining timbers as well as sawlogs. It is our opinion that round mining timbers could be cut more profitably from over-mature lodgepole pine stands nearer the mines. If such proves to be the case a much higher diameter cutting limit could be practiced in the pine-larch fir stands both to the profit of the logging company and the community as a whole.

A three-man crew was used on this study which was carried on at the logging operations of the Anaconda Copper Mining Company near Greenough, Montana. The crew completed the field work October 24 and moved on to the next job the following day.

The second study was planned to furnish detailed information on a tie operation in the larch Douglas fir type of northwestern Montana. A large lumber company in northwestern Montana whose principal business is to furnish ties and timbers for the Great Northern railroad is now following the plan of contracting the cutting of ties on its own holdings to small tie operators. The operator or contractor logs the chance,

cutting the tie species into tie logs and the pine and spruce into sawlogs. The ties are manufactured at a portable sawmill set up on the job and the sawlogs are shipped to the company's large band mill. It is planned to obtain detailed information by tree sizes from the stump through the tie mill.

The study is being carried on at the Kinshella operation near Lupfer, Montana. The crew is composed of eight men besides Anderson. Work started October 26 and will be completed in the field by November 4.

Extensive Revision

Several jobs dealing with the extensive revision project covering Idaho and Montana were completed by Bradner during the month. Additional work on the project included reports covering the drain by fire and insects, the commodity drain as related to forest products other than lumber, shingles and lath, and an estimate of the availability and quality of the sawlog material in Idaho and Montana.

In compiling the report of the accessibility of the sawlog material Bradner was aided by Assistant Regional Forester Koch who worked up the National Forest figures for Montana and North Idaho. The Region 4 Office was asked to furnish the estimates for South Idaho.

The availability of the sawlog material was figured on the basis of the following zones.

- (1) Timber with a positive value based on the past five-year average lumber prices.
- (2) Assume a \$5 increase in lumber prices.
- (3) Timber which will require more than a \$5 increase to give it a positive realization value.

The following tables show the percentages by species available under the three zones.

Montana

Per cent of Total by Zones				
Zone	: Idaho White : Western Yellow :			Total
	Pine	Pine	Other Species	Species
I	68	79	14	29
II	32	20	37	33
III	-	1	49	38
	100	100	100	100

North Idaho

				: Total
				: all
Zone	: Idaho White Pine	: Western Yellow Pine	: Other Species	: Species
I	80	50	12	34
II	16	21	26	23
III	4	29	62	43
	100	100	100	100

Treated Timber Experiments

The treated ties in test tracks established by the Northern Pacific Railroad near Plains and at Thompson Falls, Montana, in cooperation with the Forest Service in 1907, and 1915, respectively, were inspected by Whitney on October 20-21. An inspection of treated and untreated posts placed in a fence at the Ammen Place, Missoula, Montana, in 1916, was made October 25.

The test track at Plains originally included 2,260 green and seasoned untreated and 390 zinc-treated ties of western larch and Douglas fir. All of the untreated ties had been replaced about sixteen years ago and none of the various lots which were laid untreated attained an average life of more than 7.7 years. In the inspection made on October 20, 1931, it was found that the few zinc chloride treated ties still in service are now in very poor condition and should be removed next spring. While about 8 per cent of these treated ties will have remained in the track for 25 years, the actual average life will be 17 years for the zinc-treated Douglas fir and 18.5 years for the zinc-treated western larch ties.

The test track laid near Thompson Falls, Montana, in October, 1915, originally included 1675 ties of which 1575 were creosoted and 100 untreated. The purpose of this study was to determine the average life of ties from several Rocky Mountain species untreated and treated with creosote. In addition, it was desired to compare the value of Vignoles rail chairs of several types with standard Northern Pacific plates in reducing mechanical wear and splitting.

All untreated ties consisting of 50 Rocky Mountain Douglas fir and 50 western larch have been removed on account of decay. The untreated Douglas fir proved to have an average life of 7.5 years and the untreated larch an average life of 6.9 years. A total of 106 creosoted ties have been removed from this track. Of this number only 19 ties were removed on account of decay, 71 on account of "plate trouble" and 16 because of mechanical wear.

In 1925, when the entire track was relaid with 100-pound rails, all of the Vignoles rail chairs and old Northern Pacific plates were replaced with standard plates 7-3/4 x 10-7/8". Prior to their replacement the railroad had experienced considerable trouble with the Vignoles rail chairs in that the nuts holding the plates worked loose and could not be tightened conveniently. It was found impossible to remove the bolted Vignoles plates from 60 of the good ties so it was necessary to remove them from the track entirely. The ties taken out of the track for this reason have been designated as removed on account of "plate trouble". Eleven ties taken out in 1923 for an examination of the Vignoles plates were also designated as removed on account of "plate trouble".

A comparative statement showing the number of replacements of treated ties originally equipped with Northern Pacific plates and with Vignoles rail chairs follows:

Original Track Equipment	No. of Ties Laid	Removed From Track		Cause of Removal
		No.	%	
N. P. Plates	799	20	2.5	Mechanical wear 16 Decayed and split 4
Vignoles rail chairs	776	86	11.1	Plate trouble 71 Decayed and split 15
Total	1575	106	6.7	

While the inspection records for the different groups of ties show considerable variation in regard to checking, splitting and plate wear, all creosoted ties including lodgepole pine, white fir, Douglas fir, larch and western yellow pine are showing good resistance to decay. Only 7 ties were removed from the track in 1931.

The 1931 inspection of fence posts at the Ammen Place, Missoula, Montana, on October 25 shows all of the butt treated lodgepole pine posts still in place and 41 per cent of the untreated split cedar posts removed. No evidence of decay was found in the creosoted butts of either the round or split lodgepole pine posts after 15 years of service. Present indications are that these treated pine posts will last twice as long as the untreated western red cedar in the same fence.

Miscellaneous Products Items

Bradner and Anderson attended the Pacific Logging Congress which convened in Spokane October 21 to 23, inclusive, for its 22nd session. "Selective Cutting" and "Quality Logging" were the subjects under

discussion at the first day's meeting. Director Munger and Axel Brandstrom of the Pacific Northwest Experiment Station presented papers discussing economic selection in logging. Members attending the congress journeyed to the headquarters camp of the Clearwater Unit of Potlatch Forests, Inc., near Lewiston, Idaho, for the second day of the meeting to inspect the Company's young stands which are being cut selectively with the object of logging only profitable sizes at present and securing a second cut in 25 or 30 years. The Company mill at Lewiston was also visited before the special train returned to Spokane. "Tractor Logging" was the main subject under discussion at the last day's meeting.

While in Spokane for the Logging Congress Bradner and Director Munger conferred with Mr. D. T. Mason, Manager, and Mr. S. V. Fullaway, Secretary of the newly formed Western Pine Association, regarding the original agreement which Region One had with the Western Pine Manufacturers Association for furnishing lumber price statistics.

Under the original agreement, the Western Pine Manufacturers Association, for a consideration, furnished the Forest Service with monthly lumber price statistics separately for the Spokane and Oregon Districts. These prices were compiled by the Region One Office of Products into quarterly and annual summaries which were distributed to members of the Association and the Forest Service. The mill run values averaged over a period of years are used by the Service in Regions 1, 4, and 6, as the selling price of lumber in figuring stumpage appraisals. Item prices by thickness, width and grades under each species when averaged over a period of years form the basis for figuring values in Regions 1 and 6 woods and mill studies. Under this agreement the Forest Service in Regions 1, 4, and 6 probably had access to more complete and detailed lumber price statistics covering the pine region than any of the other Regions.

Membership in the new association includes a majority of the larger pine operators in Montana, Idaho, Oregon, Washington, California, Arizona, New Mexico and Colorado. It may be possible, under a new agreement, for the Association to furnish detailed monthly lumber price statistics separately for the following lumbering districts; Spokane, Blue Mountains - Oregon, Klamath, California, and Arizona-New Mexico. It would appear a good plan for the western Regions to take advantage of this offer. Region One has made good use of the price statistics and would certainly wish to continue the plan which has been in effect in the Spokane and Oregon Districts since 1913.

Lumber Prices and Movement

	<u>July</u> <u>1931</u>	<u>August</u> <u>1931</u>	<u>September</u> <u>1931</u>
Av. Mill-run Prices			
Idaho White Pine	\$31.35	\$28.61	\$26.12
Western Yellow Pine	17.60	17.19	17.69
Larch-fir	13.25	14.57	13.48
White Fir	9.93	11.56	10.45
Spruce	18.04	16.68	16.89

	<u>1930</u>	<u>1931</u>
Shipment and Cut		
Shipment	118,368	85,486
Cut	113,479	75,771

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PACIFIC NORTHWEST FOREST EXPERIMENT STATION

General

Logging Congress

Messrs. Munger, Lodewick, and Brandstrom attended the three day Logging Congress in Spokane. "Selective Logging" had a prominent place on the program, with talks by Munger and Brandstrom of the Station and Mr. Stevens of Mason and Stevens. The possibilities for more profitable logging of Douglas fir by practicing some form of economic selection were very favorably received by the lumbermen at this convention. At the closing banquet, Mr. Frank H. Lamb, the principal speaker of the evening, stated that the proposal for a radical change in the method of Douglas fir logging through the application of the principles of economic selection was perhaps one of the greatest contributions that had been made at any Logging Congress.

The field trip to the operations of the Potlatch Forests, Inc. at Clearwater gave an interesting demonstration of industrial forestry by the economic selection principle. All of us at the Station were very favorably impressed by the method of cutting being employed in the younger stands, in spite of having to see it under most unfavorable weather conditions.

One of the two resolutions passed by the Logging Congress was an endorsement of the work of the Western Forest Experiment Stations and a request that their appropriations be continued, mentioning particularly, urgency for the early completion of the forest survey.

Rangers' Training School

Munger and McArdle gave evening talks at the Rangers' School at Wind River, the former on "The Experiment Station in Its Relation to the Rangers' Work" and the latter on "Fire Studies". Isaac also had a day with them in the field, particularly to demonstrate the silvicultural experiments in the valley.

Staff Meetings

The plan has been begun this month of holding staff meetings one and one-half hours in length at a fixed hour each week. Hitherto such meetings have been at irregular intervals. At each meeting current routine or administrative matters will occupy a part of the time and the remainder will be given over to the exposition by some project leader of his study.

Visitors

Mr. C. C. Smoot of the Bureau of Chemistry made headquarters at our office for some days. He is in the West investigating the practicability of western hemlock bark for conversion into tanning extract. We were able to give him valuable contacts with which to get the information he was after. Mr. A. D. Lindsay of the Australian Commonwealth Forestry Bureau also spent some time with us. Dr. Haven Metcalf and Professor Shirley Allen were among our other callers from a distance.

Fire Equipment Congress

McArdle attended the meeting of the Fire Equipment Committee in Spokane and presented the preliminary results of our smoke detection tests.

New Laboratory

Our new laboratory space, rented in cooperation with the Forest Insect Field Station, has been partitioned, electrified, and is ready for occupancy. Until the new Federal Building is constructed this

laboratory will very satisfactorily accommodate the overflow of office workers that can not be accommodated in our present quarters; this winter the National Forest officers, detailed for the "Speed of Attack" studies and their computing assistants will be housed there.

Douglas Fir Protection Problems

In response to two requests from Regional Forester Buck, Minger and McArdle prepared memoranda on the handling of Douglas fir region and McArdle prepared memorandum discussing various aspects of the snag problem on old burns, particularly analyzing the time that elapses between a crown fire in Douglas fir and the over-topping of the resulting snags by the new forest. He found that about twenty-five years after the fire (assuming restocking to be prompt and plentiful) the remaining snags would be about the same average height as the larger trees in the second growth.

Section of Forest Products

Lodewick spent the greater portion of his time in revising the utilization files of the section, and in compiling a card index of the wood-using industries by cities and towns. All of the primary and secondary industries are included which are not covered by Census Bureau cards. A card is being made for each concern, and all known information pertaining to that concern is entered thereon. So far, only information already in the files has been used, but it is hoped that the cards can be brought up-to-date by checking from other source material.

On October 10 and 11, Mr. D. M. Brouse of the Madison Laboratory was in town. The first morning Johnson and Lodewick took him to visit the Portland Mfg. Co., the Regional Forester, and the Inman-Poulson Lumber Co. On Sunday Lodewick drove him to the Eagle Creek Ranger Station so that he could note the conditions of the paint service panels.

Special service was rendered to Mr. F. M. Groshong, Supervisor of Manual Training in the Portland Public Schools by securing for him a piece of Paulinia tomentosa wood he desired, and by starting negotiations to get a piece of "banyan" wood from the Philippines. Advice was also given to Hoquiam Chamber of Commerce regarding the cause and avoidance of compression failures in veneer spruce. The original inquiry was initiated by the Grays Harbor Veneer Co.

Minor Forest Products Study

During the month Johnson completed the report on the minor timber industries of Oregon and Washington. This study included those industries producing poles, piling, fuelwood, fence posts, hewed ties and timber,

pulpwood, shingle bolts, excelsior bolts, veneer blocks, mine timbers, and cascara. Information relative to the first six of the industries listed has been given in previous reports.

The production of shingle bolts in 1930 amounted to 17,672 cords, the equivalent of 10,603,000 feet log scale, which is less than two per cent of the total material entering into shingle production.

Veneer block production in 1930 amounted to 26,107,000 board feet, of which 93 per cent was Douglas fir, 4 per cent black cottonwood, and 3 per cent Sitka spruce and bigleaf maple.

Only 4,500 cords of black cottonwood excelsior bolts were produced in this region in 1930.

The production of round and split mine timbers amounted to 1,106,900 cubic feet. About 686,500 cubic feet were shipped to Mexico and other states. That consumed locally includes 145,000 cubic feet of converter poles used in the reduction of copper ore.

Yellow Pine Mill Scale Studies

It is remarkable in comparing results of the Shevlin-Hixon and Mt. Emily Mill Scale studies, how consistent certain relations are. The amount of lumber produced from a log of a certain size/always from three to four per cent higher at the Mt. Emily Mill. At the Shevlin-Hixon Mill; on the other hand, less time was needed to cut such a log into lumber indicating that this mill slabbed heavier, practiced less intensive manufacture, and recovered less lumber because a higher daily production was desired. Overrun per cent on the basis of all sound logs was 15.30 per cent at the Shevlin-Hixon Mill, and 21.42 per cent at the Mt. Emily Lumber Company Mill.

Copies of the Mt. Emily Mill Scale Study report were distributed to cooperation agencies and to regular Forest Service channels.

Breakage Study

Rapraeger has made a good start on computing the volumes in the study of woods losses in felling timber. He is being assisted by Victor Todd, a junior computer from the Civil Service list.

Forest Survey

In order to have a line on the proper organization of personnel and to develop technic, the job of compiling and recapitulating all data gathered from both office records and field work in the Columbia

River Oregon release unit was started during October. This release unit of 3,241,000 acres consists of Clatsop, Columbia, Washington, Multnomah, Clackamas and Hood River Counties and has private, O & C and national forest ownership groups within its boundaries. Bolles and Buell were brought in for this work, which will consist of compiling volumes in both board and cubic feet, compiling type acreages, the preparation of type maps, the working out of growth figures and the working out of cutting depletion for this unit. Whether or not fire depletion can be safely figured for as small an area as this remains to be seen.

It is hoped that all the problems which might arise in the winter of 1932-33 when the office work on the remaining 10 release units will be done will be encountered while working up this one release unit this winter. Methods, proper forms, organization of personnel, correction and conversion factors and other details connected with the final recapitulation of results can be developed this winter so that when the whole organization starts at this job next winter there will be a minimum of confusion and delay.

With the exception of the two men on this office work, all field men working on private lands in the region are still in the field. On the national forests, the end of October saw a cessation of field work on all forests but the Siuslaw and the Mt. Baker.

The new base maps of the region, which were mailed to those cooperating with the survey and to other interested agencies, have been returned with many corrections and suggestions for additions. Most of the people who looked over these maps must have taken considerable interest in them, if the red pencil corrections and suggestions are a sign of interest.

Forest Insurance

October was devoted mainly to work on the climatic phase and to the analysis of the fundamental loss figures as shown by the State Foresters' reports for interpretation and integration according to the findings of the detailed field analyses and the supplementary individual fire reports. This is the first step in the development of the actual loss figures that will be used in conjunction with the inventory figures produced by the forest survey. The process involves the summarization of the annual report figures, the application of the corrections indicated by the detailed field analyses, and the first breakdown into classes as indicated by the field analyses and the supplementary reports.

With the exception of the determination of the exact style that will be adopted for the zone maps in order best to meet all the requirements, a preliminary draft of the final report on the climatic study has been completed and is ready for discussion and bringing into final form.

Selective Logging in Douglas Fir

Approximately one thousand acres of timberland in the Columbia National Forest were cruised under a cooperative arrangement between the Office of Forest Management and the Experiment Station. The work was undertaken in order to secure field data that will lend itself to intensive selective appraisal of stumpage values. A 100 per cent cruise was made of trees over ten inches in diameter. A running tally was taken to allow cruise summaries to be made for either 1-1/4, 2-1/2, 5, 10 or 40-acre units of area, whatever may prove desirable for the purpose of detailed analysis. Trees above 25 inches in diameter were classified individually as rough, medium, or clear quality under specifications which are designed to tie in with the log value classifications followed in the mill scale studies. Later a complete analysis will be made of this area in which the results obtained in the mill scale and logging costs studies will find direct application as the basis of the appraisal.

Reports on four mill scale studies have been submitted by Hessler and Company. The results of these studies call attention to the need for further work along this line. The most evident conclusion that may be drawn from these studies is that the present system of commercial log grades does not furnish a solid basis for appraisal of timber values. The differential in values within each log grade is entirely too great and too erratic to justify reliance on the present grouping of log values. The grouping of logs as rough, medium, or clear, for logs of different diameter gives, according to these studies, a better index to value. It appears, however, that we shall need to learn a good deal more about the effect of density of grain and other factors in order to feel at all sure of our ground in setting up a reliable basis of log value classification.

The work on the logging cost studies is progressing toward the final write-up. The staff is down to two men who are employed on setting up and checking final graphs and tables. The work of compiling and analyzing data on the trend of stumpage values is also under way.

A summary of Brandstrom's findings as to the cost of skidding logs of various sizes, various distances by various types of machines is shown in the following table taken from his paper for the Logging Congress.

Summary of Direct Costs in Yarding

Type of Machine	Direct Costs** In Dollars									
	Yarding Distance in Feet									
	300	600	1000	2000	4000	8000	16000	32000	64000	128000
12x14 Steam Tower Skidders	3.40	.47	.35	43.14	.84	.37	4.15	.95	.43	
300 H.P. Gas Slack Lines	2.89	.66	.28	3.20	.73		3.06	.37		
12x14 Steam High Lead Yarders	3.34	.77	.28	4.95	1.14	.42	8.17	1.91	.72	
200 H.P. Gas and Diesel	3.49	.76	.26	4.52	1.00	.37	6.91	1.62	.59	
100 H.P. Gas Yarders	1.96	.30	.22	3.00	.81	.38	5.40	1.54	.80	
30-35 H.P. Gas Yarders	1.44	.35	.21	3.17	.79					
60 H.P. Crawling Tractors*	1.17	.39	.21	1.37	.49	.27	1.64	.63	.34	

*With High Lead Arch.

**Direct costs include labor, supplies, maintenance, and repair costs.

Fire Studies

Charting Lightning Storms

The occurrence and paths of movement for lightning storms during the period 1924 to 1930, inclusive, have been charted. A start has been made on the 1931 reports. A conference was had with Mr. Wells of the local Weather Bureau Office relative to further use of these charts in analyzing the atmospheric conditions responsible for lightning storm occurrence. From the analyses thus far completed it appears that there are many more thunderstorm days in Washington and Oregon than meteorologists commonly suppose. On the average, there are about 50 days during the fire season when lightning storms occur somewhere in the region. On some of these days only a single local storm occurred, but on other days there were storms over most of the mountainous sections of the two states. For Oregon there are about 6 days of general storms each season; and Washington has an average of 4 days of general storms during the summer months. There is, however, great variation between individual years. An analysis of lightning fires indicates that practically all of these fires are attributed to general storms; almost no fires are attributed to local storms. The Weather Bureau offers some hope of giving adequate warning of the occurrence of the few general storms the region annually experiences.

Static and Lightning Storms

The recording milli-ammeter records of static intensity for five years are being compared with charts of lightning storm occurrence based on lookout reports. Thus far there is no evidence that static intensity, as we have measured it, gives any advance warning of lightning storm occurrence. It was found that the time of any increase in static intensity corresponded precisely with the time when lookouts reported a storm to be starting. When there were no storms actually in progress there was no measurable amount of static. The amount of static varied according to the distance of the storm from the recording station. The apparatus picked up storms several hundred miles distant, the maximum range being greatest at night. Further analyses of these records are now being made.

Mensuration

The usual miscellany of prewinter jobs confronts Meyer and his mensurational computers at this time. Some of the more important studies which will be completed or made during the winter are (1) the yields of selectively cut stands of western yellow pine, (2) the yields of even-aged stands of western yellow pine, (3) the synchronizing of 20 years' records on several sets of permanent plots in even-aged Douglas fir, (4) the construction of Douglas fir volume tables based upon material gathered in its entire range, and

(5) estimates of growth for one or more release units of the forest survey. An important phase of (1) the yields of selectively cut stands, which is just being started, is the study of diameter growth. This is expected to disclose the solution to such questions as what really constitutes release and to what extent its effect is observed, what diameter, tree, crown or age classes have the best rates of growth and respond best to release cuttings, what the effect of past fluctuating climatic conditions has been on the march of decadal increment. For this purpose, the records of about 3,500 trees taken in all parts of eastern Washington and eastern Oregon will be used. For the annual fluctuation in growth, which will give the basis of determining the existence or non-existence of climatic cycles, about 10 trees in 24 different areas have been measured ring by ring for life spans ranging from 200 to 400 years.

Silviculture

Thinning - Western Yellow Pine

Kolbe spent several days with Ranger Anderson in establishing a thinning plot in a young, even-aged western yellow pine stand on the Ochoco Forest. This is the second set of such plots on this forest, the first pair having been put in last year.

Regional Races of Western Yellow Pine

The fall examination of the Deschutes and Whitman regional races of western yellow pine plantations revealed that severe damage had been done to the trees by rodents during the past year. On the Deschutes plot rabbits damaged 18 per cent of the planted trees by cropping the new growth. One fifth of the total number dead this year was killed by gophers. On the Whitman plot little damage from rabbit cropping occurred, but mortality due to gopher work amounted to 87 per cent of the total dead. These plantations which were established along with four others in 1928 have a survival of 32 per cent on the Deschutes and 20 per cent on the Whitman area. Isaac made the examination of the plantation on the Columbia Forest, which is flourishing excellently.

Methods of Cutting in Western Yellow Pine

The heavy seed crop of 1930 has left its mark in some localities by producing a great many ^{new} seedlings, while in other places the only sign of a seed crop is numerous empty cones.

Early in June of this year Kolbe found that the seedlings of 1931 origin in the western yellow pine cutting plots on the Crater Forest numbered 444 trees per acre. However, the examination made by Kolbe and Litchfield early in October revealed that this year's reproduction had dwindled down to about two trees per acre. The high mortality was probably due to drought, heat, or cold.

On the Deschutes Forest where a light rain fell late in June, the 1931 germinated seedlings on methods of cutting plots were found to be very much better.

Wind River Experimental Forest

Isaac has prepared reports on the two proposed experimental forests to be set aside at Wind River. One consists of 7,000 acres of old growth Douglas fir and hemlock, a corner of which was fire killed in 1902, and the other consists of a 4,000 acre tract of 85-year-old Douglas fir.

SOUTHERN FOREST EXPERIMENT STATION

General

Demmon spent practically ^{the}entire month in Washington. V. B. Davis reported at New Orleans for assignment to the Survey. Prior to his appointment, Davis was forester for the Union Lumber Company, with headquarters at Fort Bragg.

Sinclair accepted a transfer to the California Forest Experiment Station and left New Orleans about the middle of the month. The members of the Station will miss Sinclair, and wish him success in his new location.

Among the visitors to the Station during the month were Arthur Koehler, of the Laboratory, and Mr. Ben May (a timber grover), of Mobile, Alabama; and Mr. N. G. T. Simerly, forester (retired), of the Tennessee Coal and Iron Company, who owns timbered areas in South Alabama. Both Mr. May and Mr. Simerly came to the Station in search of information concerning fire damage to longleaf pine. Mr. May is planning to thin this winter extensive areas and intends to pay about 50¢ per acre for the labor in order to help the unemployment situation. Eberly and Possin spent a day going over the McNeill Experimental area with the Alabama visitors.

J. W. Girard arrived at the Station on October 20th, and spent several days going over the volume tables with Putnam. Additional data taken on 250 trees in Missouri by W. W. Ashe were found to check very closely with the tables based on data collected in Louisiana.

Pessin spent the first half of the month at Camp Pinchot relieving Gommer, who was on annual leave.

Forestation

Wakoley collected twenty-five bushels of longleaf pine cones on land owned by the Great Southern Lumber Company near Folsom, Louisiana, and some small additional samples near Sun, Louisiana, and near Pearl River. Ten bushels apiece of shortleaf and loblolly pine cones were received from the Long Bell Lumber Company, completing the Station's seed requirements for the year.

Work on the report on natural reproduction of longleaf pine in the South Pasture at Bogalusa was continued during the latter half of the month.

It is reported that in the vicinity of Starke and Lake City, the slash pine seed has been shed, while the longleaf pine seed began to fall toward the end of the month.

Gommer spent the latter part of the month making plans for an arboretum at Camp Pinchot. Pessin made observation at Camp Pinchot on the cone destruction by the fox squirrels. On the laboratory plots he found fifteen cones of longleaf freshly destroyed, within three feet from the parent tree. Cones were dropping from the tree while the observations were being recorded.

Naval Stores

Starke Branch

All the chipping and scraping was finished. The last dipping will be made in November. Dix Gilmer-McCall cups were set up on slash pine trees in Kingsley, in cooperation with the University of Florida, and a carbon dioxide gas generator was used to fill these cups with gas and exclude air. The yields were not very good.

A modified carpenters' adz was received which is to be used for making French faces. Gum samples were collected for Dr. Hall and wood blocks and chips for Dr. Gerry.

The Sampson tract atlas book for 1926-1930 groups was completed. Weather studies indicate that the maximum yield of gum is reached before the light intensity and temperature reach the maximum and the relative humidity reaches the minimum.

An effort is being made to correlate the gum yield with the physiological activities of the tree.

The rainfall at Starke has been very low throughout the month. The total rainfall during the last two months amounted to 1.32 inches.

Lake City

Harper and Osborne marked off fire lines for the Olustee Tract. Part of the time was spent in making plans for the new offices in Lake City.

Management

Wahlenberg, Bickford, and Bennett reexamined the Mr plots and made a five year remeasurement of the Olla Tower Plots at Urania, La. Heyward established plots for longleaf pine reproduction studies on the Olustee Experimental Forest near Lake City, Florida.

Protection Grazing

While at Camp Pinchot, Pessin brought up to date the data collected on the seedling counts at McNeill, Mississippi.

Huberman, using Dr. Auten's method for testing the water absorbing capacity of the soil on the McNeill plots, found that the soil under the reproduction in both unburned areas (grazed and ungrazed), had a higher absorptive capacity than in the open. On the burned areas (grazed and ungrazed), the absorptive capacity of the soil was higher in the open than under the reproduction. In the open grazing reduces the absorptive capacity more than burning, while under reproduction, the absorptive capacity is reduced nearly as much by grazing as by burning. His tests were confined to the Orangeburg fine sandy loams.

Protection - Fire

Wahlenberg, Bickford, and Bennett established plots in the Parker area at Urania and studied fire damage to longleaf pine.

Darmon spent some of his time in Washington compiling references on fire for a bulletin.

Heyward spent the last week of the month collecting soil samples from burned and unburned areas.

Wahlenberg completed reports on extensive surveys in southern Alabama and in Texas. Wahlenberg, Bickford, and Bennett burned over three of the fall fire plots at Urania, La.

Pessin and Huberman measured a number of trees at McNeill on four grazing plots to determine the effect of fire and grazing on seasonal terminal growth. The results are indicated in the table.

TOTAL TERMINAL GROWTH OF LONGLEAF
PINE SAPLINGS FOR 1931

Diameter Class in inches	: Unburned		: Burned		: Unburned		: Burned	
	: Ungrazed		: Ungrazed		: Grazed		: Grazed	
	: 1931		: 1931		: 1931		: 1931	
	: Number:	: terminal:	: Number:	: terminal:	: Number:	: terminal:	: Number:	: terminal:
	: trees:	: growth:	: trees:	: growth:	: trees:	: growth:	: trees:	: growth:
	: :in feet :		: :in feet :		: :in feet :		: :in feet :	
Under 1	: 2 :	: .80 :	: 22 :	: .24 :	: 13 :	: .79 :	: 13 :	: .49 :
1	: 15 :	: 1.22 :	: 16 :	: .69 :	: 20 :	: 1.42 :	: 16 :	: 1.10 :
2	: 44 :	: 2.50 :	: 10 :	: 1.68 :	: 15 :	: 2.24 :	: 20 :	: 1.31 :
3	: 26 :	: 3.22 :	: Too scattered :		: 2 :	: 2.65 :	: 1 :	: .90 :
	: :		: to be considered :		: :		: :	

These results confirm similar measurements made after the 1930 growing season.

Ecology

Pessin, aided by Huberman, brought the root competition studies at McNeill to a close for the season. The balance of the month was spent in the office compiling the data collected on the root competition plots.

Many grasses and other plants were collected at McNeill for the herbarium at New Orleans. The vegetation of the McNeill Experimental area is now well represented in the Station herbarium.

Financial Aspects

The entire staff of the Financial Aspects study spent most of the month in the office compiling data for the Polk County, Texas, and Hempstead County, Arkansas studies. Bond made a short trip to Baton

Rouge for a conference with Extension Forester Moore and Dr. Thompson, of the Agricultural Experiment Station, planning cooperation on a study of Union Parish, Louisiana.

Erosion

During the month of October, much progress was made in the soil erosion studies at Holly Springs, Mississippi. Due to a 45-day rainless period, no data were obtained from the run-off and erosion plots.

Moginnis, with Bennett's help, established three additional run-off plots bringing the total number now in operation to 11. One of these plots was a duplicate of the previously established broomsedge covered plot. The other two were established under the rather complete canopy of a mature red oak forest representative of the best remaining timber land in northern Mississippi, but differing from most in that it has been protected from fire for more than 7 years. One of the forested and one of the broomsedge plots will be burned during the late winter of 1932 to test the effects of annual fires on surficial run-off and erosion.

Other work accomplished during the month was: (1) Construction of a hog-proof fence around all plots; (2) installation of a gutter system for four of the run-off plots to collect the run-off water and eroded soil and deliver it directly into a container; (3) establishment of eleven mil-acre quadrats on which the vegetation was mapped in detail. The purpose of the quadrat studies is to trace the development of native vegetation coming in on eroding land as affected by fire, rate of erosion, and other factors.

Huberman's stay at Holly Springs furnished opportunity for testing the water absorbing capacity of the soils of the run-off plots, using water absorption cylinders and the methods developed by Dr. Auten. Although the differences in absorption by forest soils and those in open fields were marked, very little correlation was found between the results of these tests and the erosion and run-off data secured from the plots to date.

Forest Survey

Pine Survey

The preliminary survey in the Southern Pine Region was continued during the month with the first one, then two, and then again one crew. These frequent changes in personnel were due to the volume table work in New Orleans, and the inauguration of the Hardwood Mill Scale study.

Four of the 13 lines in Pearl River County have been completed, and the fifth line is well under way.

Lentz spent a week in the field with the parties helping line up the work. He and Lehrbas obtained ownership data and plotted it on a county map. Several large lumber companies own tracts of 30,000 to 50,000 acres in the county. The mills formerly operated by these companies have been down for 2 to 5 years and the cutover lands are receiving little or no attention. Longleaf pine is not reseeding the cutover areas in a satisfactory manner and large areas of "denuded" land have resulted.

Girard spent a day in the field with Lehrbas, Davis, Cruikshank and Lentz and helped settle some of the questions which were bothering the field crews. Many of the sample plots have fallen in the narrow branch heads or "bays" which are less than 2 chains wide. These bays contain some inferior hardwoods and sometimes a scattering of loblolly, slash or pond pine. It was decided that these bays would be considered as part of the rolling uplands unless they were wider than 2 chains. If the survey line ran in a bay for more than 2 chains the width of the bay itself would still be the governing factor.

The Working Plan for the Pine Survey has been revised several times but is not as yet ready for mimeographing. Certain questions cannot be settled until further investigations can be carried on in the field.

D. E. Lauderburn, Extension Forester for Mississippi, spent a day with the Pine Survey Crew. He was surprised at the large extent of cutover not restocking or completely denuded land found in the northern part of Pearl River County. Driving along the usual state and federal highways gives one an erroneous impression of forest conditions in the county. The survey crews, running lines at 3 mile intervals encounter all classes of land. Lauderburn submitted a memo containing certain recommendations for changes in the field procedure. The recommendations dealt with the collection of growth data particularly.

Hardwood Survey

Work in the Bottomland Hardwoods was temporarily resumed with the inauguration of a cooperative mill scale study. The Forest Products Laboratory planned the work to fit the needs of the Survey. Messrs. Garver and Sweet were present at Oak Grove and helped get work under way and then left Miller in charge with Wollin to do the lumber grading. Putnam, Wheeler, Beyer, and Cruikshank of the Survey Staff helped constitute the mill crew. Tom Wilson, Senior Ranger on the Pisgah National Forest was loaned to the study and is doing the log scaling and grading with Putnam and Girard's help. Granger has been present at the study at the first two mills. Winters also accompanied the crew in order to familiarize himself with log and lumber grades. Lentz acted as advance agent and made arrangements at Tallulah with the Chicago Mill and Lumber Company, the Sondheimer Lumber Company, and at Wisner, the Fisher Lumber Company.

The first mill where work was carried on was the E. L. Bruce mill at Oak Grove, West Carroll Parish, Louisiana. Seven hundred twenty-seven logs were tallied through this mill. A large percentage were oak, but a good run of ash was also obtained. The procedure followed at each mill is similar to the procedure set up by the Forest Products Laboratory in their other mill scale studies. Each log was sealed by Ranger Wilson under Forest Service scaling instructions using the Scribner .C rule. Each log was graded as 1, 2, or 3, according to the log grades set up for the hardwood survey and later revised at Oak Grove. A serial number was marked with chalk on the end of each log and all boards sawed from the log were marked with this number. The boards on the green chain were then tallied by grade and scale keeping the cut of each log on a separate tally sheet. Five to six men are required for such a study.

Girard, Granger and Lentz spent three days gathering data on large red oak trees to strengthen Putnam's volume tables. With only a few mills at present cutting red gum it has been difficult to find trees of this species especially in the large diameter classes.

The close of the month found three of the survey men at Poplarville, Mississippi, on the Pine Survey and five working on the mill scale study at Tallulah, Louisiana.

Hardwood Growth and Yield

Winters spent the latter part of the month on the mill scale study of the bottomland hardwood species that is being conducted by the Forest Products Laboratory and the Southern Forest Experiment Station. This study is showing clearly that defect in logs of a given species is very closely correlated with the quality of site upon which the individual trees are found. In general, trees of most species tend to be more defective and cut out lower lumber grades when grown on low, wet flats than when grown on the better drained soils. This is particularly true of the defect in lumber of several red oak species caused by grub worms.

Bull is continuing his work in Washington on the analysis of the Hardwood Survey data.

Forest Products Pathology

The first part of October was spent in the completion of the summaries of the results of the large and small/dipping tests carried on during the 1931 season. These will be incorporated in the complete report now being prepared for trade journal publication, covering the progress made in 1931 on stain and mold control at Southern mills.

Log treatment tests were established on hardwood operations at Oakdale and Ferriday, Louisiana. A third is being conducted at the W. T. Smith operation, Chapman, Alabama, and preliminary small scale tests of several new compounds are also being made at Bogalusa.

A paper on the progress in the use of chemical treatments for the prevention of deterioration in stored logs was prepared and read at the annual meeting of the Southern Logging Association, October 21. Considerable interest in the use and application of the most promising treatments was shown by the loggers; Mr. Rogers, of Eastman-Gardner told of the successful use of Lignasan as a spray for hardwood logs stored for two months under severe summer conditions.

The results of a preliminary investigation of the effect of lumber dipping treatments on the seasoning rate of pine and hardwood lumber indicate that all of the better treatments, especially the phenolated compounds, retard the movement of moisture from lumber in the air-seasoning pile.

Pine Disease Investigations

The month of October was spent by Siggers in the field on an extensive survey of the brown-spot needle blight of longleaf pine. This survey has for its purpose a determination of the prevalence of the disease and its relation to the time elapsing since burning.

Hardwoods Disease Investigations

The study of fire and decay injury in the immature stands of the delta hardwoods was continued by Kaufert at Ferriday and Monterey, Louisiana, during the first two weeks of October. A study of the cultural characteristics of the fungi causing decay in the mature stands of the bottomland hardwoods was initiated during the week spent in New Orleans. The last week of the month was spent with the mill scale crew at Oak Grove, Louisiana.

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SOUTHWESTERN FOREST AND RANGE EXPERIMENT STATION

The Proposed Mount Graham Experimental Forest

Pearson, accompanied by Assistant Regional Forester Randles and Supervisor King of the Crook, spent three days on Mount Graham early in October, examining the top of the mountain with reference to its suitability for a Douglas fir-Engelmann spruce experimental forest.

The mountain rises from a semi-desert plain of about 3000 feet elevation to a maximum altitude of 10,500 feet. A succession of plant zones ranging from semi-desert grassland to Engelmann spruce type is encountered in the ascent. Between altitudes of 8000 and 10,000 feet are found the heaviest stands of Douglas fir and Engelmann spruce in the Southwest. Douglas fir attains a diameter of 4 feet or more, and a height estimated at 130 feet. Western yellow pine in the lower portion of the Douglas fir type develops the cleanest boles seen anywhere in Region 3. Engelmann spruce assumes its characteristic straight, slender form, reaching heights well above 100 feet. Douglas fir stands yield forty to fifty thousand board feet, and Engelmann spruce stands twenty to thirty thousand board feet per acre. Both Douglas fir and Engelmann spruce stands are generally overmature and have suffered from bark-beetle attacks. Reproduction is poor. Evidences of past overgrazing are conspicuous, but soil cover is now on the mend. Practically all domestic livestock are excluded; deer are said to be present in excessive numbers.

An area of approximately 3000 acres was selected for an experimental forest. The main forest types represented are Douglas fir and Engelmann spruce. Species occurring in mixture are Western yellow pine, Mexican white pine, white fir and cork-bark fir. There are five major drainages within the area, each supplying a permanent stream. Since all of the water is being used for irrigation or domestic purposes, it is evident that watershed protection must be a primary object of management.

Transportation facilities will be afforded by a good Forest Service road. This road now extends to an elevation of about 8500 feet, and according to present plans will be built across the top of the mountain through the lower portion of the proposed experimental forest. It will be about a three hour drive from the top of the mountain to Safford, the nearest town. Safford and several other valley towns of 2000 to 3000 inhabitants, will furnish a limited market for forest products of which fuel will always be an important item. The lower portion of the mountain is being developed for recreation.

Santa Fe Plots

Five permanent sample plots in cutover stands of Western yellow pine, which were established in the year 1911, were re-measured on the Santa Fe Forest during the latter part of September. This is the fourth re-measurement of the plots and gives a total record of 20 years' growth, to date. Inasmuch as the current data have not yet been compiled no quantitative results pertaining to the growth of the trees and stands can be given at present.

The significant thing is that most of the plots are restocking well, especially where grazing has not been too severe. Of especial

interest is the observation that on two of the plots, namely those on the Pecos division of the forest, many Douglas fir seedlings are now becoming established. These two plots are within a state game refuge established six or seven years ago and on which grazing by domestic stock has been reduced to a minimum. Under protection, a good mat of litter from both the pines and the understory of oak and mountain mahogany has accumulated. It is believed that the accumulation of this litter, and especially because it has not been greatly disturbed, is the chief reason why Douglas fir seedlings are now coming in. Judging from the vigor of the seedlings, as well as the thrifty condition of some of the older Douglas fir trees on the plots, the climax type is thought to be Douglas fir rather than Western yellow pine. There are extensive areas within what is commonly regarded as yellow pine type that are undoubtedly to be classed as Douglas fir type and which, under protection, will revert to that climax form. What has probably happened is that the original stands of Douglas fir were destroyed by fire and other agencies and then the yellow pine, together with scrub species of oak and mountain mahogany took possession. Now that conditions have again become favorable for Douglas fir, that species is reclaiming the ground. Under adequate protection, the climax type will reestablish itself; the important thing is to give nature a chance.

Jornada Experimental Range

Under the natural revegetation project, the fall charting of quadrats was almost completed except for one series in the mountain pasture and the clipping studies. Field observations and measurements were completed on the snakewood and yucca studies and on the mesquite major plots, established four years ago. Compilation of the season's data was started.

A preliminary work plan was developed for the mesquite sandhill restoration project and the first steps were taken to establish a ten chain gridiron of the new section enclosure. The reconnaissance of the enclosure should be completed early next month.

Campbell put in several days on the grazing capacity manuscript and Canfield continued with his compilation and analysis of the 1928 grazing reconnaissance.

Campbell completed the assembling of the notes on terminology, nomenclature; compilation and analysis from the Range Research Methods conference and forwarded them to the secretary of the meeting.

Professor Lantow's class in range management at the New Mexico State Agricultural College spent a day at the Jornada with the consideration of the methods and results. Since the college has an animal husbandry ranch of its own, the principal emphasis at this meeting was placed upon the management of range vegetation.

Cooperrider spent two days at the Jornada considering the station program. He spent a half day with the staff in going over plans for the mesquite sandhill restoration project.

On October 11, Ranger F. N. Aros was transferred from the Apache Forest to the Jornada to fill the new position made available this fiscal year. His coming will facilitate greatly the collection and compilation of data on the projects and will expedite the preparation of publication.

Parker Creek Forest Influences Station

A location for a field station to be devoted primarily to studies of forest influences has received tentative approval. The area selected is on Parker Creek in the Sierra Ancha region of the Tonto forest. A land area of about two sections will be recommended for withdrawal for experimental purposes. The region presents the many types of vegetation, soil and physiographic features required for study. The area proper is very rugged, varies from 4800 to 7000 feet in elevation; types of vegetation range from shrub and grassland formations to local areas of live oak, pine and fir forest. The forest types occur with respect to balance between available water supply and moisture requirement as influenced by such factors as local canyon temperatures. The drainage area is a representative miniature of large parts of the several million acre Salt River watershed. A location survey, now completed, has been made with some difficulty as the region has not been covered by land office, or topographic surveys. The building site is in a forest grove of Arizona oak (Quercus arizonica). Trees are magnificent specimens; the location one of exceptional beauty. Ground plans are being perfected before beginning any improvement work. This aims at preserving the natural state of the area and taking into account any future expansion in building.

A report on the area for withdrawal as an experimental forest will be prepared in the near future.

Dr. C. R. Hursh of the Appalachian Station was a visitor in early October. He examined the erosion installations and like work on influences in the Tonto and Crook forest region, and accompanied Cooperrider on an overland trip from Tucson to Las Cruces.

In connection with project work and plans, Cooperrider spent several days during the month in the field on the Jornada in New Mexico, in the region of Flagstaff, Arizona, on the pine reproduction-range work, and on the Salt River watershed on influences and range projects.

Santa Rita Experimental Range

During the month field work on the Santa Rita was completed, except for periodic field trips that will be made throughout the winter in connection with certain projects. The fall charting of quadrats indicates a relatively high density of vegetation as well as an exceptional height growth, and why not with a summer rainfall of almost twenty-four inches and a yearlong rainfall to date of slightly over thirty-two inches?

Two additional observation plots were established between West station and Amado well in connection with the Gravelly Ridge Project. Rough topographic and detailed vegetative maps were made of both areas and observations on growth and utilization will be continued at monthly intervals throughout the winter and spring. All possible exposures were included in the plots so that the data secured will give us a sound basis for location of permanent study areas in connection with the project.

The market outlook is anything but promising, as few buyers have visited this section and none of them are taking any chances on offered prices. Ruelas has sold his yearlings at five and a quarter. Parker is rounding up and if he does not get his price, will turn his calves over to a feeder and wait until they are fed out, for his money, and so it goes in the stock business. If the worst comes to pass, we can fall in line with other businesses and sell on the dollar down and dollar a month payment plan.

To the Friends of Mr. and Mrs. Hugh Cassidy

On the afternoon of October 14, surrounded by life long friends and most beautiful floral tokens, we paid last temporal tribute to Mrs. Hugh Cassidy. The service was held in Albuquerque, where she spent most of her life. I was able to be present, to in that small measure represent all of you who could not be there, to carry your sympathies to the living.

To those of you who may not have learned, Mrs. Hugh Cassidy passed away October 12 after a brief illness. Hugh Cassidy has been associated with the Southwestern Station for the past two years and was formerly with the administrative branch in Region 3.

C. K. Cooperrider.

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RESEARCH ACTIVITIES DURING OCTOBER IN R-2

Upon returning from the Nebraska Forest at the first of the month, Roeser's time for the first week was largely taken up by routine tasks at the Fremont Station and in preparing reports and handling accumulative correspondence in the Colorado Springs office.

On the 8th the first remeasurement of the Black Forest plots near Monument, Colorado was made. The Black Forest is an extensive area of privately and State owned western yellow pine timberland lying on the high plains across the Platte-Arkansas Divide, adjoining the east boundary of the Pike Forest near the middle of this boundary. The timber-stand has been heavily cut-over and badly mismanaged in the past, largely because of the ready accessibility of the area and the local demand for all forms of forest products. In general character, the stand is dissimilar from the typical western yellow pine stands of the montane region of Colorado, since it is largely overstocked and undersized. The light, sandy, relatively sterile, soil facilitates natural reproduction, but at the same time does not tend to stimulate rapid growth or sustain heavy yields. The chief problem, however, is not so much one of attempting to control reproduction, as it is one of obtaining the fullest use of the limited site possibilities by proper thinning and cutting practice, in view of the very favorable economic situation affecting this territory.

The two recently remeasured plots were laid out in 1926 on a school section; the Experiment Station cooperating with the Colorado Agricultural College, School of Forestry and the State Forester in initiating and conducting the project. One plot was thinned, the other was left in a virgin condition. In thinning to 340 trees per acre from approximately 900, the average diameter was increased from 4.5" to 7.5". The net average diameter increase on the control plot in five years was less than .2", a rate of one inch in 25 years, which is just about the normal growth rate under virgin conditions. There has been an actual decrease in net volume due to heavy mortality. The amount of this loss has not yet been determined. On the thinned plot, the amount of stimulation varied considerably, depending entirely upon the relative spacing of individual and groups of trees. So far as the thinning in itself, which was confined almost exclusively to stagnated and suppressed individuals, is concerned, it did not create more than a limited amount of response. However, diameter increases running above 1" in five years and averaging above .5" were determined for trees, growing under open conditions, indicating an inherent possibility for a three-fold increase in the growth rate and a radical reduction of the duration of the rotation period for saw-log material. This will anticipate, however, a much heavier cut than was attempted in the experiment, or, at an estimate, a density to include not over 200 trees per acre.

A visit to the Black Hills Center constituted the last field trip of the year. Two weeks were spent in the "Hills", part of the time with Assistant Regional Forester Thompson, in charge of the Office of Forest Management, during which time attention was concentrated on three projects, as follows:

- a. Institution of a thinning project in crowded, thrifty, pole stands;
- b. Annual observations in the Este Gulch brush disposal experiment; and
- c. Extension of the progress of natural reproduction project to include a series of plots in the recently burned-over area, called the Rochford Burn.

With the assistance of the Forest staff, a block of four one-half acre plots was laid out near the Nemo research center base in a typical thrifty 50-60 year old pole stand, to study the result of various degrees of thinning for small post and pole products upon subsequent growth. This project has been on the activity calendar for at least five years. The market for the kind of material to be cut is favorable and becoming more so all the time, thus providing a very practical basis for the experiment. No similar study in young stands has been undertaken in western yellow pine. A more or less radical departure from the "customary" thinning experiment is represented in the heavy thinning, which anticipates no additional intermediate cuttings before the final crop is harvested. The status of the stand on each plot, following thinning, which will probably be done by Ranger labor, will be as follows:

No. of Plot	Spacing Distance	Average Diameter (inches)	No. of trees per acre	Basal area per acre (sq. ft.)
1	14.6' x 14.6'	6.97	204	54.05
2 uncut control	6.8' x 6.8'	5.03	938	129.13
3	9.4' x 9.4'	6.21	490	102.97
4	11.3' x 11.5'	6.56	340	79.69

On the brush disposal plots, established in 1928, pictures were taken from established camera points, and detailed observations made on designated quadrats of the present condition of the brush. This particular feature of the experiment has been somewhat "up in the air" following the decision not to put into effect the provisions of the original working plan for good administrative reasons. To attempt to arrive at some conclusions concerning the rate of brush disintegration, a considerable number of wood sections was obtained upon which specific gravity determinations were later made at the Fremont Laboratory. The general impression gained from the field inspection indicates that disintegration is progressing at a rather slow rate, although the brush appears to have settled considerably more than the loss of only about 30% of the needles would seem to occasion.

A series of twenty-three natural reproduction and eleven artificial seeding quadrats (10' x 10' square) was established along a line traversing a northeast and a southwest slope from gulch to gulch through a clean-burned stand near Dumont. It was in this vicinity that the Rochford fire of September, which burned over an area of almost 22,000 net acres, raged most fiercely. All vestige of green vegetation, except in a few isolated patches, where the fire did not crown, has been destroyed and the site is one supposedly representing maximal reproduction difficulties. On each of the seeding quadrats, 3/8 lb. of Harney western yellow pine seed was sown. Quadrats were also established upon which seed from the same lot will be sown in the spring. Seed crop failures during the past few years and the absence of any crop this year cast a discouraging light upon the prospect of natural regeneration.

Plans have been discussed for establishing another series of quadrats in the Mr-1 (Progress of reproduction on burns) projects on a site where the relation of seed source to the rate of natural reproduction may be more intimately studied. The necessary field work to institute this phase of the project will probably be undertaken by Forest personnel late this fall or in the spring.

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- How to Preserve the Bird or Mammal Skin, T. D. Burleigh
- Growth and Mortality of Chestnut Sprouts, R. M. Nelson (Forest Worker)
- Litter Deposition and Accumulation in the Pine-Oak Type of the
Southern Appalachians. I. H. Sims. (Jour. For.)

PACIFIC NORTHWEST

- Practical Application of Silviculture to Overmature Stands Now Existing
in the Pacific Douglas fir Region. T. T. Mungor.
- Descriptive Memoranda of Forest Survey Field Work and General Conditions
in Southern Tillamook County, Ore., Paul. Kemp.
- Descriptive Memoranda for Forest Survey Field Work and General Conditions
in Whatcom County, Wash. F. Moravets.
- Descriptive Memoranda for Forest Survey Field Work and General Conditions
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in Wahkiakum County, Wash. W. Bolles.

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 Part II - by A.J.F.Brandstrom
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- Scholz, Harold F. Physical Properties of the Cove Soils on the Black Rock Forest. (Bul. 2 of the Black Rock Forest)
- Schumacher, F. X. Rev. of: Forest Measurement, by Harold C. Belyea. (Jour. For. Nov. 1931)

FOREST TAXATION INQUIRY

September and October, 1931

The staff has been engaged entirely on office work, both in completion of progress reports and in writing different sections of the comprehensive report.

A preliminary edition of Progress Report No. 16, "Digest of Forest Tax Laws in Effect October 1, 1931," was prepared for the benefit of the Timber Conservation Board. Quite a number of minor corrections and improvements will be incorporated in the final edition, which will be sent to the regular mailing list. In the meantime a few copies of the preliminary edition are available at the New Haven office to meet requests from any who have immediate need for the most up-to-date information as to existing forest tax legislation.

Progress Report No. 17 entitled "Taxation of Forest Property in North Carolina," by Paul W. Wager and Roy B. Thomson, has been completed and sent to Washington for multigraphing. This report includes all of the more important data obtained last year in the North Carolina study.

Addresses were made by Fairchild (not as a representative of the Inquiry) dealing with taxation in its relation to the current depression before the New England Tax Officials' Association at Rangeley Lake on September 24 and before the Hartford Chamber of Commerce on October 22.

An analysis of the published income tax statistics for 1926 to 1928 indicates that corporations engaged in the lumber industry, agriculture, and mining have all borne a heavier burden of state and local taxes than the average of all corporations if the relation of taxes to income be taken as a standard of comparison. On the contrary, the paper and pulp industry appears, on the same basis, to have been in a favored position. However, the lumber and wood products corporations appear to be in an average position in regard to taxation if the comparison be made on the basis of property value. The following table may be of interest, but it should be understood that the base for the ratios under "property" is only approximate, for while the compiled balance sheet items that most nearly reflect tangible property were used, these do not represent with exactness either the actual investment in, or the actual value of, the property on which the taxes in question were levied.

RATIOS IN PER CENT OF TAXES OTHER THAN FEDERAL INCOME TO
INCOME BEFORE INTEREST AND TAXES AND TO PROPERTY VALUES

Class of corporations	1926		1927		1928	
	In-	Prop-	In-	Prop-	In-	Prop-
	come	erty	come	erty	come	erty
	(1)	(2)	(3)	(4)	(5)	(6)
All active	16.8	1.6	19.1	1.6	18.1	1.7
Lumber and wood products	21.8	1.6	34.7	1.6	25.5	1.5
Paper, pulp, and products	12.3	1.4	11.9	1.4	12.3	1.4
Agriculture & related industries	38.2	2.0	37.1	1.9	29.5	1.8
Mining and quarrying	20.2	1.2	36.3	1.1	24.4	1.1

